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# COMPUTERWORLD

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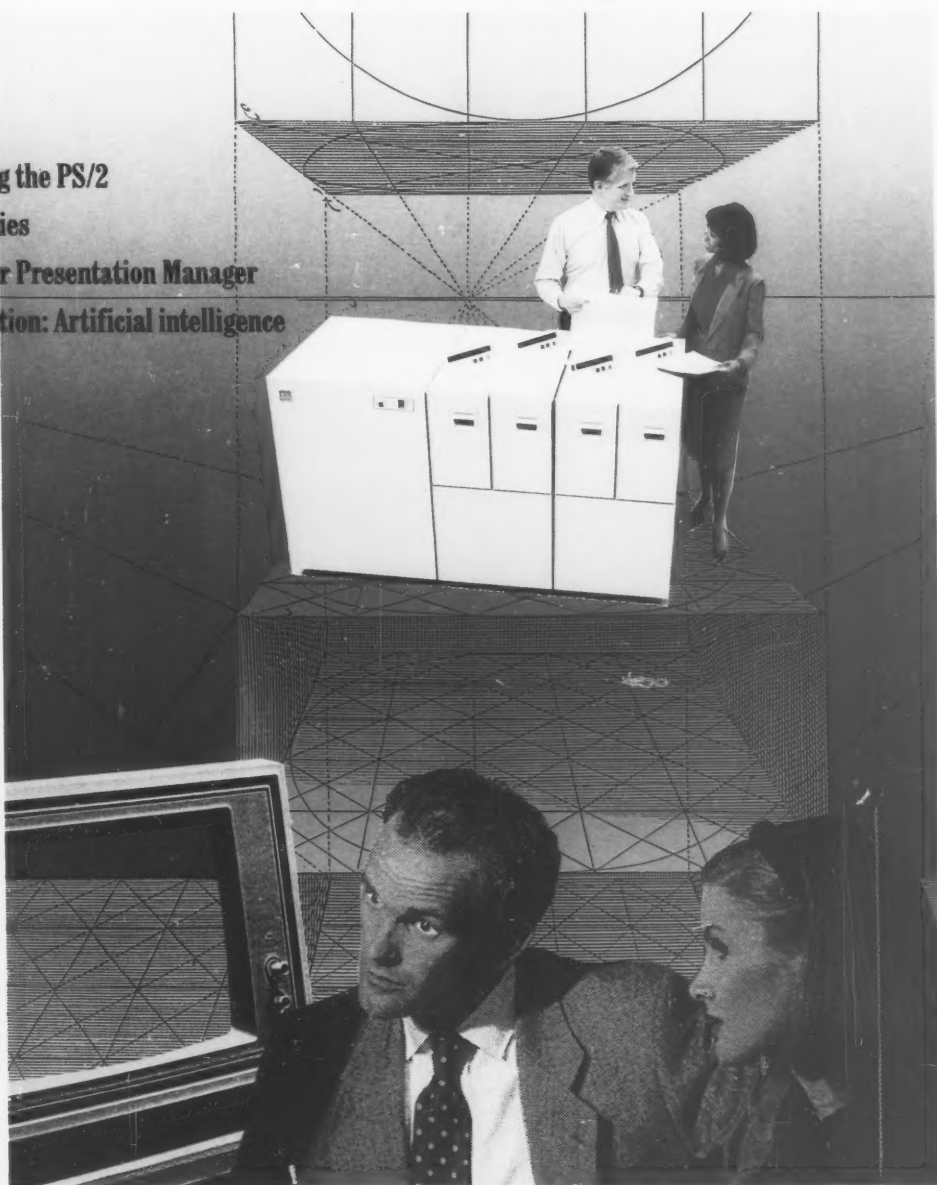
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# in focus

**SUBSTITUTE TEACHER** You're never too young to be a potential client. That thinking may be behind PC vendors' push to sell their wares in the K-12 marketplace. By establishing early brand loyalty, companies are laying the groundwork for product preferences that may carry through to adulthood. After all, the young scholar of today may be the MIS manager of tomorrow. By Stan Kolodziej. *Page 10.*

**EXECUTIVES SHIFT THE DATA BALANCE** As the pace of the business world has quickened, so, too, have the information demands of executives. With paper becoming passe, executive information systems are becoming the rage. More than just a passing fad, however, these business systems contain the right blend of information and technology to assist top managers in strategic decision making. By Helen Pike. *Page 21.*

## Deciphering the PS/2

By Johanna Ambrosio. April marked the first birthday of IBM's Personal System/2. Although the machine set sales records and earned the praise of many, others remain skeptical because its benefits are still promised rather than real. Read about why some MIS managers are holding out for answers and holding back their money. *Page 15.*

## Rock 'n ROM

By Daniel Gross. In the right situation — loads of data going to a large number of recipients — CD-ROMs are a hit, offering an alternative to mainframe access, microfiche and paper. MIS is also using the technology in the key area of intracompany data flow, easing the crunch of information bottlenecks. But until standards make the disks economically feasible for small- and medium-size organizations, CD-ROMs will remain out of reach of much of the market. *Page 19.*

## Presentation Manager

By Michael Guttman. The rumor mill is churning away with tidbits on IBM and Microsoft's Presentation Manager, no doubt in part due to the well-publicized legal battles occurring in the graphical interface field. But there is much to learn from the available information that can help companies prepare themselves for the Presentation Manager's arrival. This consultant sifts through the reports and reveals the facts you need to know. *Page 31.*

COVER BY MARC YANKUS

## SPECIAL SECTION



## Artificial intelligence

The saga of AI is a rise-fall-rise story. The cast of characters includes arrogant science types with imposing systems, investors with deep pockets and technophobic customers expecting robots and getting nothing. Into this hapless situation enters a hero — the PC. Features Editor Michael Tucker examines how the humble micro has breathed life into the faltering AI field. *Page 27.*

## From the Editor

Including your letters to us. *Page 3.*

## Manager's Corner

Jim Young on reviving the users group concept. *Page 4.*

## Q&A

Former NCC chairwoman on how PC trends are shaping MIS. *Page 4.*

## News & Analysis

Report on PC support costs; custom chips; IBM/Metaphor alliance; Unix interface battle; developments in the EIS field. *Page 5.*

## Products

Tech Talk on TI, Apple expedition into AI; aftermarket service; DVI disk; 386-based micro. *Page 34.*

## Blue Beat

Brian Jeffery on the PS/2's structural inheritance. *Page 34.*

## Calendar

Industry events. *Page 38.*

## The Insider

Michael Millikin on why graphical user interfaces don't guarantee productivity. *Page 40.*

## Log Off

Figures show how support costs have become the single greatest expense associated with PCs. *Page 40.*



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## FROM THE EDITOR

A bad  
aftertaste

**T**he floodgates for IBM OS/2 software are about to burst. But the customer response may be less than desired for these long-awaited programs.

It has been a little more than a year since IBM and Microsoft announced the OS/2 operating system.

Not much has happened since, other than a lot of speculation about the system's eventual impact. At last month's Comdex/Spring '88, IBM and Microsoft were the hosts of a booth featuring several hundred software programs for OS/2. The catch? Most of the software won't be ready until the third or fourth quarter. And then the software may prove to be a bad match for Intel 286-based machines because of speed and memory requirements.

The Presentation Manager, due out in the fourth quarter, is expected to be the juggernaut that will propel OS/2 into the mainstream. But the inadequacy of the 286 remains. Machines using the 286 — including several in the IBM Personal System/2 line — simply don't have the power and memory resources to provide the performance users expect from the operating system. OS/2 will be used commonly on Intel 386-based machines but will still be a power hog. Because of this drawback, OS/2 probably won't come into frequent usage for some time — at least until a 386 version is developed for more powerful PS/2 models.

The wait has resulted in a lot of unhappy PS/2 users who thought IBM would provide them with a working desktop package in a realistic time frame. Users who bought a low-end PS/2 expecting to soon step up to a higher class of computing are going to be particularly upset. Furthermore, although IBM advertises the PS/2 as a family of products, each machine is very different and does not necessarily get users to the same place at the same speed as another model; customers who are unaware of this difference may be more likely to turn to alternative vendors in the future. With IBM already losing some market share to its competition, this is particularly bad news.

Even though OS/2 is probably destined to become the desktop standard into the 1990s, its initial flavor is leaving a bad taste in many customers' mouths.

Will the real originator  
of 4GLs please stand up?

Your article in the Feb. 3 edition of *Computerworld Focus* entitled "The fate of 4GLs" is of special interest to me because I originated a fourth-generation language system in 1964.

Of course, I didn't know then that it was a fourth-generation language. But it did generate Cobol statements from input parameters. In lieu of screen input (because screens didn't exist then), the process was to translate data names according to their location on a report layout sheet and then perform mathematical operations based upon the location of commands on the sheet.

The data names were taken from what I coined as a "dictionary," a set of mnemonics describing each field in what may have been the first data base system, because I originated it in 1963. Because the term "data base" hadn't yet been coined, I called it "the single-file concept" because each data element appeared only once in the file although used by many different application systems.

All this was done while I was a computing sciences specialist with a California aerospace company. We later set up an outside DP service and marketed the fourth-generation language under the trade name of Carol. Regrettably, what I knew about computers I didn't know about marketing and thus left it to others to become millionaires.

The game of who-invented-what-first is a dangerous one and perhaps never ending, but in the 25 years since then, I've never heard of an earlier fourth-generation language or data base system. Perhaps if you publish this letter, those who believe that they thought these techniques up before I did will rush to make themselves known.

Donald D. Irvin  
Dallas

Don't be so quick to discount  
PL/I in IBM's plans for SAA

In Tony Percy's "No blueprint for SAA" story in your Feb. 3 issue, he said, "IBM has to be careful about stating openly what products . . . have been definitely discarded in SAA planning, such as PL/I . . ." I belatedly hasten to point out that IBM has not "definitely discarded" PL/I.

P. Hessler, IBM Europe vice-president of market development, has written to the European IBM users group Guide about PL/I in Systems Application Architecture. He explains that "we have accepted this requirement" and "that resources have been assigned to develop the implementation plan." Here in the U.S., we are expecting further news in this area before August.

PL/I is doing well and will remain the productive, general-purpose language of choice for applications needing to exploit its environments.

Hank Hamilton  
PL/I Project  
Share, Inc.

Emotions play understated role  
in departmental decisions

I enjoyed Michael Tucker's March 2 editorial very much. Emotions have been playing a big role in decisions about departmental computing, and it was nice to see him address that issue. In addition, the quotes were great, and as always, the writing was wonderful to read.

Irene S. Nesbit  
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MANAGER'S  
CORNERUsers group  
tune-up

Jim Young

**A**t the time that MIS was implementing end-user computing, the technology was working, but the users were not. They needed intellectual help in the form of a practical application of technology that the proscribed training programs did not provide. They needed ideas, motivation, reassurance and reinforcement.

But MIS was not in a position to smother them with assistance. The resources were not there. MIS did not always have the skills and knowledge, and an MIS-dominated program would most certainly have defeated the purpose of end-user computing. Moreover, MIS was frustrated at being out of the communication loop, unaware of whether the end-user computing experiment was working.

Company users groups came to the rescue. They gave the intimidated, isolated user a sense of community and belonging. This peer group helped to germinate new ideas and build on old ones in a positive way. They also provided reluctant users with positive role models that could get them moving in the right direction. The assistance was low-key and nonthreatening. Best of all, the help was informal, inexpensive and efficient.

Alas, many users groups have fallen on hard times. Once users got up and running, they no longer saw the need to invest their time in group activities. The original spontaneity was lost, and without a guiding group structure, the process deteriorated into nonproductive repetition. In some cases, the interests of the many were held hostage by the desires of a few special interest groups.

Even MIS occasionally abandoned users groups when it became clear that the MIS department did not enjoy a dominant status. Lack of resources or shortsighted priorities have also led MIS to neglect yesterday's cause celebre — the users group.

Yet no one is claiming that end-user computing programs have fulfilled their potential. The need for further user creativity,



extended use of technology, commonality of direction and sharing of successful ideas is as great as ever. There may be other ways to achieve these goals, but until they are identified and proved, the users group should be retained as one of the few winning ideas in end-user computing.

However, to make it work as it used to, the users group concept needs an overhaul (or at least a tune-up). Users must be enticed to take part and see their participation as a valuable use of their time and energy.

With today's more particular and erudite users, success depends on a more studied approach to users groups. The following are some ideas to put zeal back into users groups:

- **Management support.** Users groups used to be as informal and unsanctioned as a pickup game of basketball, in which a wide variety of players contributed openly. However, in an increasingly tense workplace, users need to know that their investment of time in users group activities is encouraged by a management team that supports the concept of end-user computing.

- **Everything in moderation.** Some users groups collapse because of an overly ambitious program. They meet too often and for too long and try to cover too much territory in too much depth. These groups expect substantial contributions by members. This overexuberance drives away both the serious confirmed end-user computing "affectionados" and the casual attendee. The program should be matched to the ability and needs of the average member.

- **Balance of leadership.** Domination by a clique of fanatics can drive rank and file members away. Users group organizers need to make sure (delicately) that the data base users, for example, don't monopolize the agenda and shut out the spreadsheet users. By the same token, elite power users should not be allowed to exclude the less sophisticated user. Meetings, newsletters and other support activity should include something for everyone.

MIS should be especially sensitive to its inadvertent control. It may have to exert some leadership

to overcome an absence of direction. MIS just needs to be sure that users are active and free enough to feel that the group is theirs.

- **A spiced-up format.** Most users groups start out on the right foot by finding activities and agenda items that are effective. Then they spoil the success by the monotonous repetition of the same thing. Roundtable solution sharing, for instance, is great but becomes less exciting the umpteenth time it occurs. Users groups should vary the events they undertake.

- **Meeting formats, newsletter content, events settings and so on** should also be creatively modified. Such a fresh approach will not only animate the usual participants but may appeal to an entirely new set of members.

- **Expanding the offerings.** Users groups must realize that the diversity of their potential market is expanding. The novice user and casual user are still candidates for participation. Many of yesterday's beginners are enlarging the boundaries of end-user technical sophistication.

Advanced users must be stimulated to continue to attract their interest without diminishing services to other users group members. Thus users groups should not be treated as homogeneous any longer but segmented to focus attention on subgroups. Some things have to be in common, however, so that the subgroups are not totally isolated from one another.

- **Seeking new frontiers.** The quest to satisfy more sophisticated users and offer variety to all group members is not a single person's job. Others can help from within and outside a company. The users group organizer can tie into company activities, such as recognition programs, bulletin boards (electronic and otherwise), success fairs, employee orientation and training programs, even formal processes like planning, budgeting and so on. That person can reach out to users groups of other companies for ideas or even joint efforts and tie in with key vendors for material, support and suggestions on users group activities. Participation in regional or national users groups can also help in the search for contemporary material.

Users groups and similar structures serve as an important avenue for end-user computing, simultaneously nurturing it, promoting it and controlling it. With so much expected from this program, there is bound to be a disappointing period in its development when performance is less than expected. In such an event, organizers must not admit defeat by giving up on the company users group. Fresh ideas, a transference of energy and a modified approach can have it working better than ever.

## Q AND A

## Mary Rich

*Life after NCC: Show's former chairwoman finds PC trends shaping MIS*

**M**ary Rich owns her own consulting business in El Segundo, Calif., entitled PFS, Inc. But don't confuse her company's name with the package sold by Software Publishing Corp. To Rich, PFS stands for Pays for Sailing and refers to her favorite hobby of sailboat racing and to the original intent of her business — to underwrite her hobby. But the former chairwoman of the National Computer Conference doesn't have much time these days to do any sailing, competitively or otherwise. She is heavily involved in the design of decision support systems using fourth-generation computing languages and consults on computing issues for small businesses on up through departmental-level computing in large corporations.

Involved in the data processing industry for nearly 20 years, Rich today sees a lot of trends that developed from personal computer technology helping shape MIS thought. She recently spoke with Senior Writer Helen Pike.

**What do you think of the trend of expert systems and decision support systems on the PC level? Are they going to give fourth-generation languages a boost?**

I think they already have — especially in the fourth-generation language area. Products like [Information Builders, Inc.'s] Focus that have successfully migrated down to the PC level are appearing as No. 3 and No. 4 in surveys of what users plan to buy. To me, the whole idea of bringing computing to the user and allowing him the flexibility to do his own thing is probably one of the most exciting trends I've ever seen.

**How widespread is that trend?**

Well, the trend is actually far more widespread than most people realize. They don't realize it because MIS departments still don't want to let that knowledge out, and that's a terrible thing to say, but I'm afraid it's still true. So a lot of the data base management systems that have a fourth-generation language connected to them are coming in through the back door. Users, especially in major corporations, still have a tremendous amount of purchasing power. The price of products is small enough that the users don't need any signature author-



ity other than knowing their own purchase order.

It becomes widespread because one person does it and he talks to another person who says, "Hey, I can do that" and gets his copy, then he talks to a third person, and it starts to mushroom.

I guess the other part [making it widespread] is that users are getting a lot more comfortable with PC technology. I'm talking about the people in the 30 to 45 years of age bracket who are not so afraid of looking like fools anymore. They're starting to get into it.

**How much are MIS managers in major corporations aware of PC data bases?**

I think it is very likely [that they are not aware]. I'm going to pick numbers out of the air from my own personal experience: I would say you're looking at more than half. I would not be surprised if somebody did a survey to find out that 75% to 80% of the data bases in major corporations are departmental with very little coordination, if any coordination, with MIS.

**What do you see as the future of the PC data base? Is it a time bomb waiting to go off?**

What I hope is going to happen is that MIS is going to wake up and find out this underground economy does exist. [MIS] is going to recognize [the PC data base] is a tremendous resource and will put major effort into coordinating [it], getting [it] on local-area networks, getting data dictionaries and getting users groups going so people can share information.

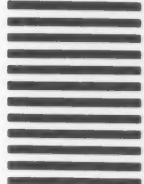
**Do you see a possibility that there might be a merging of applications?**

What I see happening is a great deal of expansion of applications on the PC. It's been coming along during the last three or four years, but now, all of a sudden, you're starting to hear about it because the big players have legitimized it. With things like [Lotus Development Corp.'s] Agenda, all of a sudden text-based systems are in. Apple Computer, Inc. and its hypercard, [and] all of sudden hyper-text-type applications are in. There are systems like picture data bases, which couldn't have even been conceived of on the mainframe. [Now] you could put

*Continued on page 9*



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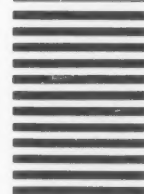
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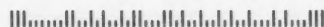
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5 ☐ Business Service (except DP)  
6 ☐ Government - State/Federal/Local

- 7 ☐ Public Utility/Communication Systems/Transportation  
8 ☐ Mining/Construction/Petroleum/Refining  
9 ☐ Other User \_\_\_\_\_ (please specify)

Vendors

- 10 ☐ Manufacturer of Computers, Computer-Related Systems or Peripherals  
11 ☐ Computer Service Bureau/Software/Planning/Consulting  
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7	27	47	67	87	107	127	147	167	187
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# news & analysis

## UPDATE

### The fascinating facsimile

Fascinating. Believe it or not, the facsimile might be one of the hottest industry products these days. The fascination with faxes, says Marshfield, Mass.-based CAP International, Inc., is rising as the technology continues to become faster, less expensive, more convenient and more of a successful competitor to overnight document delivery.

CAP's Judy Pirani, a senior market analyst, says that faxes are becoming more of a fixture in U.S. businesses along the lines of copiers and phone systems. And one of the most active areas in the fax market is personal computer fax boards, plug-in modules that can turn a PC into a fax for as little as \$400.

CAP says computer-based fax placements will reach 33,000 in the U.S. in 1988 and climb to more than 70,000 in 1989.

### Laptops shed negative image with '87 turnaround

Laptop computers might finally be shedding their industry lapdog images and biting back.

After years of lukewarm growth and reception, 1988 promises to be the year laptops make up for lost market time, according to Venture Development Corp., a Natick, Mass.-based consultancy. Venture Development says the user chill in response to high laptop prices and display problems is a thing of the past. Mix together some improvements in laptop component technology, some price erosion brought on by increased competition and a strong personal computer market overall, and you have the makings of a laptop resurgence.

Zenith Data Systems, as well as Toshiba Corp. and NEC Corp., are the top troika of laptop sale makers. Zenith has made the latest market splash by introducing the Turbosport 386, a laptop built around the high-powered Intel Corp. 80386 microprocessor and sporting Zenith's high-contrast Page White display. The lightweight system will also carry the hefty price tag of \$7,999.

Bruce Stephen, an analyst at International Data Corp., a research firm in Framingham, Mass., says last year was a turn-

around year for laptops, with an estimated 370,000 of the machines shipped worldwide in 1987. Stephen expects bigger things for '88 and beyond.

### IBM giveth and taketh away: OKs clones — for a price

De benedictus clonus. IBM has given its blessing to the clone market. The company recently announced that it would license its Personal System/2 Micro Channel patents to prospective PS/2 clone makers. The news came about the same time that two Texas companies, Tandy Corp. and Dell Computer Corp., introduced their own PS/2 clones with much fanfare.

With IBM's announcement, the company dispelled speculation that had been building for the past year about its legalistic response to any clone vendors that infringed on its secretive position on the Micro Channel and other PS/2 patents.

However, IBM's decision is still going to cost PS/2 clone makers. Although the firm is giving the green light to clone vendors, these companies might wind up paying IBM royalties amounting to as much as 5% of their sales revenues for clones that use more than one IBM patent.

Unlike the previous PC clone era, IBM is making sure it has a hand in controlling this new market and that the market plays by its rules. IBM has already made a point by successfully delaying (or scaring away) the introduction of PS/2 clones for more than a year. Funny — now that IBM has given its blessing, it all seems anticlimactic.

### PS/2 software offerings just DOS programs in disguise

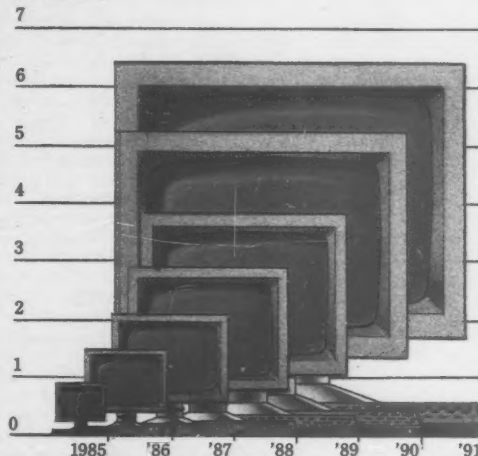
IBM Personal System/2 clones might soon have a little more to do than just run old Microsoft Corp. MS-DOS-based software. IBM's traveling Applications Forum show on PS/2s and the IBM OS/2 operating system has been proudly displaying numerous OS/2-based software programs from such heavyweights as Microsoft, Borland International, Inc., Novell, Inc., Ashton-Tate Corp. and Micropro International Corp. In fact,

*Continued on page 6*

## A billion-dollar bonanza

*Workstation\* revenues are expected to soar*

Dollars  
(in billions)



\* Includes workstations, reduced instruction set computing-based machines and IBM Personal System/2 Model 80s.

INFORMATION PROVIDED BY DATAQUEST, INC.

GRAPHIC BY BRUCE SANDERS

## PC hardware prices fall, but support costs rising

The downward slide in microcomputer hardware prices has been getting its share of attention the past few years. But if you think personal computers are a great buy these days, you might also be unaware of the accompanying rise in hidden PC costs, those costs that do not hit the corporate pocketbook until the machines are in the office.

A recent PC study conducted by Lexington, Mass.-based consultancy Nolan, Norton & Co. paints a startling picture of just how quickly those corporate support costs that buttress PC installations can rise.

The study, conducted with several of Nolan Norton's top corporate clients, claimed that in 1987, hardware and software costs made up less than 30% of the total direct investment in PCs. The major share of PC costs, more than 50%, was eaten up by support activities.

The Nolan Norton study broke PC support costs into a de-

mand side and a supply side. Demand side costs focused on such personnel expenses as training and user development. The supply side included hardware, software, technical support, maintenance support and PC supply costs. When the company totaled these costs, it arrived at some sobering figures: The average corporate PC cost \$18,000 in 1987, compared with an average PC cost of \$7,500 in 1984.

"The difference [in costs] the past few years is that most large corporations now have people in various business units who do nothing but provide support in various forms for PC users," explains Ron Evans, a manager in the research department at Nolan Norton. "Labor and training costs are high."

Evans says other recent trends that are pushing overall corporate PC costs higher

*Continued on page 8*

Chip shape: Custom semiconductor design systems come up to speed. Page 6.

## Custom chips pick up speed

The flavor of chips is changing. For several years now, the big market for semiconductor has been in producing generic, finished chips. Such chips, however, leave little flexibility for customizing computer systems to handle more specific applications and can lead to substantial software design overhead in time and money.

Under pressure from electronics and computer companies, semiconductor heavies such as Intel Corp. and National Semiconductor Corp., both in Santa Clara, Calif., have, in recent years, been offering more customized services to chip clients by designing specially commissioned chips following customer specifications. The major drawback to this setup is time. Delays due to customer backlogs can easily run longer than a month and can, in turn, seriously affect the overall competitiveness of clients in the marketplace. In this situation, clients still rely heavily on the big semiconductor companies through the design cycle.

Systems designers, however, might now have an out. Companies such as Sunnysvale, Calif.-based Actel Corp. and fellow start-ups Xilinx, Inc. and Altera Corp., both in Santa Clara, are working on specialized custom chip design systems powerful enough to enable systems designers to program the logic directly into semfinished silicon wafers for only a fraction of the design costs now incurred using standard chip design procedures.

Such systems are based on something called gate-array technology. This technology embeds electronic channels, or gates, into silicon chips. The "logic" part of such gate-array chip design concerns the specific pattern in which the systems designer closes or leaves open these gates

or electronic channels. These channels are left open until the final stages of the chip design cycle. The manner in which the numerous gate-array chips are designed determines how a computer system will perform various tasks.

Though such stand-alone design systems will carry price tags of tens of thousands of dollars, their promoters claim the tools will nevertheless open hands-on customized chip design to a greater number of the 400,000 or so systems designers currently working in the U.S.

"It will pave the way for smaller [computer systems] vendors to design specific computer applications right into the silicon," explains Amr Mohsen, president of Actel. "It will make the targeting of even small vertical markets more economical."

However, industry observers, such as Cindy Thames, vice-president of The Technology Research Group in Boston, caution against viewing these custom chip design systems out of perspective.

"In one form or another, it's been possible to customize chips for at least six years now," Thames explains. "Actel and these other companies are part of an evolution, not a revolution, in this industry. Also, because of price prohibition, custom chip design is still going to be a game for the big guys."

Mohsen argues, however, that he and others are on the verge of making major changes in the electronics and computer industries. "These systems will allow engineers at desk tops to program [chip] logic, they will allow computer vendors to better optimize products and they will open the creative stimulation of software engineers to produce a new set of software applications," Mohsen says. — SK

## IBM, Metaphor ally; cope with financial services deregulation

Big Blue wants you.

Or at least your data. In April, IBM invested \$10 million in 3-year-old Metaphor Computer Systems, Inc., a Mountain View, Calif., manufacturer that has carved out a niche designing integrated computer systems used exclusively for data analysis.

The genesis of the alliance came about at Proctor & Gamble Co., a diversified personal accessories company, which was getting a lot of mileage from running Metaphor's icon-imaged software and relational data base technology on IBM's Personal Computer and host hardware.

### Benefits on both sides

What IBM receives from its 10% ownership of the company is the right to Metaphor's research as it applies to IBM's Personal System/2 and OS/2 Extended Edition.

IBM will then build its own applications on top of the Metaphor layer, according to an IBM spokesman, who declined further details.

Among the benefits to Metaphor is IBM's sizable sales force. Metaphor already has 125 customers, most of whom use IBM host equipment. But the systems are concentrated in the consumer packaged goods, retail, banking and pharmaceutical markets. With IBM's sales backing, Metaphor says it hopes to branch out and sell to data-intensive users in insurance, securities, food retailing, transportation, consumer manufacturing and state

government markets.

With this joint arrangement, both companies are better poised to offer software products that can handle the explosion of data that has resulted from the deregulation of the financial services industry, according to David Liddle, Metaphor chairman and a company founder. The new products also are intended for the data that is accumulating from new technological implementations such as automated teller machines and supermarket scanners, he adds.

### Wheeling and dealing

In February, Metaphor inked a deal with Nielsen Marketing Research-U.S.A. in Northbrook, Ill., to help custom-design, develop and market a proprietary marketing information delivery system for Nielsen, along with related applications.

Some of Metaphor's other clients include Merrill Lynch & Co., British Telecommunications PLC, Cenex/Land O' Lakes AG Services, Lever Brothers Co., PepsiCo and the U.S. Department of Labor, the U.S. Bureau of Labor Statistics and the Department of Defense.

A day after the Metaphor announcement, IBM further strengthened its marketing focus on computer-based information technology and telecommunications by selling its U.S. copier business to Eastman Kodak Co. in Rochester, N.Y. Financial details were not disclosed. The transfer of sales and service contracts are expected to take place in July. — HP

# dB

By Rich Tennant



## Update

Continued from page 5

IBM claims that altogether there are some hundred such applications already written for OS/2 Standard Edition and that there will be 1,000 available by the end of this year.

However, the Boston stop of the IBM road show only offered, for the most part, software consisting of existing MS-DOS programs ported to the OS/2 format with little in the way of new and exciting programs built directly around OS/2.

For the really good stuff, that quantum leap ahead, users will have to wait for software modeled on IBM's upcoming OS/2 Extended Edition and Presentation Manager.

And for that, it is possible that IBM could be planning a road show redux in 1989?

### Motorola, Sun spur sleepy RISC market through products, pacts

The reduced instruction set computing (RISC) arena has changed from a sleepy little niche market to a raging bull market. Motorola, Inc. and Sun Microsystems, Inc. have been busy introducing RISC-based processors and boasting lists of computer vendors that have joined their respective RISC folds.

Motorola has been crowing about two important catches: Tektronix, Inc. in the graphics workstation market and Data

General Corp. in the mainstream computing field, both of which have pledged to build systems around Motorola's 88000 series RISC processors.

Sun Microsystems has been making a lot of its long-term joint development strategies with AT&T, but Sun's light might have dimmed momentarily with the sudden resignation of Vittorio Cassoni from AT&T's Data Systems Group in order to return to Ing. C. Olivetti & Co., his previous employer. Cassoni is credited with being the force behind AT&T's embrace of Sun Microsystems and its RISC-based Scalable Processor Architecture processors, which are slated to become the engines of AT&T's future computer network offerings. What Cassoni's departure will mean to the grand Sun/AT&T plan is not clear at this time.

### Sun enters crowded Unix/MS-DOS market with its Sun386i series

Sun Microsystems, Inc. has become emboldened enough to leave the esoteric workstation market and venture into the commercial arena with its Sun386i micro series, systems that can run Microsoft Corp. MS-DOS under Unix. Sun says it is hoping that the Sun386i will be a successful bridge between workstations and personal computers.

And in that regard, Sun will need all the help it can get, because the Sun386i micros are already joining a very crowded Unix/MS-DOS PC market that is getting increasingly harder to crack. — SK





DOS system running Lotus 1-2-3

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\*\*Cost comparisons are based on most recently published U.S. domestic suggested list prices. Cost models: Base machine: IBM PS/2 Model 80, 7040 disk, 1Mb RAM, IBM 9512 color monitor, 1Mb additional IBM RAM, IBM PrePrinter XL. 1-user DOS system: Base machine, plus DOS 3.5, WordPerfect 4.2, Lotus 1-2-3, dBASE III PLUS. 1-user OS/2 system: 1-user DOS system; substitute OS/2 for DOS. 1-user SCO XENIX system: Base machine, plus SCO XENIX 386 for PS/2, SCO VP/ix, SCO lyrix (word processing), SCO FastBASE™ (dBASE III PLUS workalike), SCO Professional™ (1-2-3 workalike), 9-user SCO XENIX system: 1-user SCO XENIX system, plus intelligent 8-user multipoint card, 8 IBM 3151 ASCII terminals. 33-user SCO XENIX system: 9-user SCO XENIX system, plus 5 more intelligent 8-user multipoint cards, 24 more IBM 3151 ASCII terminals, 4 Mb additional RAM, additional 7040 disk.

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# Mac, Open Look seek Unix interface honors

Graphically oriented interfaces for the Unix operating system are suddenly hot. While much of the industry has been focused on the commercial (and sometimes legal) rivalry between Microsoft Corp. Windows on the personal computer and the Apple Computer, Inc. Macintosh interface on the Apple machine, a similar competition may be shaping up between Unix on the Mac and Unix under Open Look, a user interface designed for AT&T by Sun Microsystems, Inc.

Both the Mac interface and Open Look simplify Unix by providing an icon-based interactive display. Both can be traced to work done by Xerox Corp. Sun and AT&T, in fact, have announced that they have licensed Open Look technology from Xerox, neatly sidestepping the possibility that Apple will sue them over the "look and feel" issue, a subject that currently has the company in court in a case involving Microsoft Windows. Apple cannot easily sue Sun for licensing technology from Xerox

when Apple itself used Xerox-originated technology to produce the Mac interface.

The Unix operating system is famed for its power, but it is infamous for its difficulty of use. After originating at AT&T, it was developed in fits and starts during more than a decade of work, mostly at universities. Because Unix was devised by software developers, it is extremely good for software development. But for the same reason, it is unfriendly to nontechnical users.

Yet during the 1980s, it was exactly those nontechnical users who AT&T targeted as the prime market for Unix. Because the operating system was multitasking and multiuser, the company believed it was a natural for Intel Corp. 80286- and 386-based computers and the best heir to Microsoft's MS-DOS.

Several million dollars in losses later, AT&T's attempt to take Unix to the masses was widely viewed as a disaster. Furthermore, technological leadership of the Unix world had shift-

ed to makers of technical workstations whose users were computer literate enough so that Unix held no terrors. In particular, Sun emerged as the leader of the Unix community and promoted itself as the champion of standards against any attempt to make Unix proprietary.

And at the same time, a market for a PC-based Unix began to look better than ever. After 1986, 386-based systems were being introduced at a considerable clip, forming an installed base of machines that were powerful enough to support Unix. Moreover, continuing delays in the debut of the Microsoft/IBM successor to MS-DOS, OS/2, generated increased interest in Unix, an operating system that was not only multitasking but multiuser as well, which OS/2 currently is not.

But the Unix user interface was still getting in the way.

Then, at February's Unix forum show, Apple took the plunge. It announced A/UX, a Unix implementation for the Macintosh. As an operating system, A/UX is standard Unix, but it includes the Apple Mac interface. With this interface, nontechnical users can exploit powerful Unix-based software yet never know they have left the Macintosh environment.

Unix software vendors

scrambled to support A/UX. Oracle Corp., for instance, announced at Unixforum that its Oracle data base management system will run on A/UX.

Open Look, however, was not far behind.

## Fruitful alliance

In late 1987, AT&T and Sun announced an alliance between their two companies in which AT&T would adopt Sun's Unix technology and take an equity position in Sun. Open Look is one of the first fruits of that alliance. It provides an icon-driven interface as well as menus and a mouse for Unix-based systems. Software vendors have moved quickly to support it. On April 11, Lotus Development Corp. announced that it is developing a Unix-based version of its 1-2-3 spreadsheet that may run under Open Look.

The Lotus announcement could be particularly significant because the company has long been seen as one of the premier vendors of software for IBM Personal Computers.

And IBM has its own version of Unix, AIX, which is now running on its Personal System/2s. The question now is whether the company will marry AIX to Windows and thus emerge as the third camp of graphical interfaces for Unix. —MT

# Support costs

Continued from page 5

include networking and customized software applications for PC users.

"Most of our [study] participants agreed that these costs will increase even more during the next few years as expected improvements in connectivity foster the creation of large end-user data bases and PC-based networks," Evans states.

The study noted, however, that such connectivity-related PC costs will be necessary to companies in the long run. PC technology, according to Evans, will play an increasingly crucial role in companies that wish to move quickly ahead in their businesses.

## Going through a stage

Nolan Norton has listed four phases, a series of PC rites of passage, if you will, that U.S. companies will pass through before reaching the point at which businesses will realize the full benefits of PC technology.

The first stage — when PCs began entering businesses — has matured.

Most companies, according to the study, have reached the second stage, namely, task automation. Here, companies aim PCs at automating tasks and improving individual productivity and are guided by some sort of technology-driven vision.

Only a few firms have placed an exploratory foot into stage three, the business process, Evans says. At this stage, existing PC investments come under investigation, and additional PC investments are driven by a tactical business vision.

Stage four, the business transformation, can be considered PC nirvana, a perfect melding of PC technology and business. At such an exalted level, the PC user community will be broad, influential and experienced, PC investments will be motivated by a strategic business vision and organizations will be poised to use PC technology to restructure current business procedures.

"At this [latter] stage, a ten-fold return on [PC] investments will be realized," Evans claims. "That's when the technology will become woven into the fabric of the organization."

That stage will also not occur for some time — perhaps not in this century. But Evans says that as more companies realize PCs' long-term benefits, the transition from stage to stage will quicken. It will also spur companies to shell out more for escalating end-user computing costs, costs that Evans estimates may account for as much as 41% of the typical corporate information systems budget by 1990, up from 30% in 1986. —SK

# TO: The executive suite RE: Direct data delivery

If there is anyone who tracks the growing implementation of executive information systems (EIS), it is Alan Paller, who earlier this year launched the "EIS Conference Report," a pastiche of anecdotal information about installing an EIS. He calls the bi-monthly publication he edits a cooperative newsletter because of the participation by executives like Apple Computer, Inc. Chairman and Chief Executive Officer John Sculley and Alan

Greif, a principal at Booz Allen & Hamilton, a management consulting company.

Based in McLean, Va., Paller is a consultant who is president of AUI Data Graphics/CA, a division of software company Computer Associates International, Inc. He is a high-profile executive who also carries the banner for graphics.

In 1979, he installed a visual on-line currency rate access program, called the Board Room

System, for the treasurer of General Motors Corp. An early form of EIS, the program provides access to dozens of financial indicators used by the treasurer's staff to make rapid decisions on management and movement of foreign currency. In the years since, Paller says he has watched similar programs take form under the EIS label and grow in use by occupants of the executive suite.

According to Paller, there are 1,600 EISs in operation in the U.S.; 130 of them are customized on top of EIS software usually purchased from two leading vendors in the field, Comshare, Inc. in Ann Arbor, Mich., and Pilot Executive Software, Inc. in Boston.

systems on trivial information," says David Friend, Pilot's chairman and one of its founders. "It has to relate to current business issues." He adds that "EIS fits in there as a feedback mechanism to gauge progress."

According to Friend, EIS's rise is, in part, due to a general awareness that information residing in the data center has not produced much value added for management.

"Information as a resource is becoming more critical to business," he says. The challenge for MIS professionals, he adds, is to think of using information as a competitive weapon, not just to

do payroll. "EIS's implementation is more successful from a forward-looking MIS guy if he takes it upon himself to put it in," Friend says.

Friend helped start the privately held Pilot in 1983. Today, the company has an installed base of more than 100 site licenses and competes head on with Comshare, Inc. in Ann Arbor, Mich. Comshare, which is a publicly traded company, has sold more than 150 licenses for its business software. At one time, Comshare had a complementary marketing agreement with IBM. —HP

# Piloting into DEC mart

DEC, Pilot sign executive information system marketing pact to link Pilot EIS, All-In-1

Digital Equipment Corp. and Pilot Executive Software, Inc. are joining forces on an executive information system (EIS). In April, the two signed a cooperative agreement to market a comprehensive interface that links Pilot's Pilot EIS to DEC's All-In-1 office automation system.

The move brings both companies closer to senior managers

who, in turn, are looking to get closer to business data that will help them make better competitive decisions for their companies. Maynard, Mass.-based DEC and Boston-based Pilot say they intend to target senior managers in vertical markets, such as the government, pharmaceuticals and consumer products.

"You can't build important



## Interview

Continued from page 4

together a system to handle excellent graphics and pictures for less than \$10,000.

**Now we may be splitting a semantic hair here. I asked the question in terms of a merger of applications, and you answered in terms of an extension of applications. Is that right?**  
Yes, that's exactly what I did.

**So you do see it more of an extension then?**

Yes, but we could go back to the merger. Probably the areas in which I expect applications to merge are in things like data bases and text processing as opposed to word processing. Under this whole image management umbrella, there's a merger of documents, letters, research, legal papers and all that type of thing in a data base format.

**Is imaging technology creating a new type of data base in the area of optical disks?**

That will be coming. Very definitely.

**For the PC?**

Yes. Probably far more likely for the PC than for the mainframe.

**Why do you say that?**

Again, to me it's almost a question of mind-set in that the mainframe applications are looking more at how we optimize on-line processing as opposed to how we can add new things into the mainframe area, whereas a PC is far more flexible. You've got a huge body of people whose minds haven't been conditioned to what the computer can do. They look at it as, "This is what I need to do, how can the computer help me?" So it's a much more open mind-set.

**Do you think the Intel Corp. 80386-based machines coming out from IBM and Sun Microsystems, Inc. are going to draw the user closer to the technology and make it easier for him to take advantage of the power and capabilities the vendors claim to offer?**

Not really. Not until we get a lot of new software for them. Again, you have to say, theoretically, something like the IBM Presentation Manager is going to help. You could not have a Presentation Manager on an Intel 8088-based machine. It's just not there. When you look at what 90% of the users can conceive of doing on a machine, an 8088 is probably overkill.

The 10% of power users are the people out there pushing for the 386. I'd give my right arm for an IBM Personal System/2 Model 80. As for my own development and everything else, I get sort of tired of sitting there watching the screen, but most users are not that sophisticated.

I would have a hard time even introducing running two tasks at the same time to the majority of the people that I've

taught. That's not a put-down, that's just the way people are.

**Companies in the workstation business, such as Digital Equipment Corp., Sun, Apollo Computer, Inc. and Apple with its Macintosh, are trying to sell their technical workstation capability, power and functionality into the MIS market. Is MIS ready for that? Or is it only specialty applications within MIS that would take advantage of these capabilities?**

You're seeing a lot of information coming out in the trade press that says OS/2 is only going to be really effective on a 386 machine, so don't tie yourself into a cor-

ner by buying an obsolete machine. Buy this, and you'll be ready for the future. MIS loves to hear that, especially in the Fortune 1,000 environment. If you want to plan for the future, look five years out, [when] the platform is going to be in a 386 machine. So whether the power is fully utilized today is irrelevant, although the vendors would never say that.

**How much of PC end-user productivity is a matter of just having better technology available vs. having smarter users?**

I don't know how you could separate the two. Users wouldn't be getting smarter if they didn't have the technology to practice on, and if the users weren't there, the

technology wouldn't be getting accepted. ... The PC's power has to be there before the user can see the possibility.

**Is there anything else that might be relevant to PC end-user productivity?**

I think the end-user community is an extremely great potential for the MIS community if they could learn to work together. MIS's PC users ... are not users. They're customers, and without customers, MIS isn't going to be in business. It is important [for] MIS to recognize the contributions that users can make to all facets; users should be involved in every single decision with computing power that involves information technology.

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News section compiled and written by Computerworld Focus staff members Stan Kolodziej, Helen Elser and Michael Tucker.



# Substitute teacher

*PCs + students = early brand loyalty*

BY STAN KOLODZIEJ

**G**et them while they're young. Though most computer vendors still reserve their top sales guns to pitch to big business, the lure of establishing early brand loyalty and increasing sales in the U.S. educational market is sending companies like Apple and IBM scrambling to bolster their educational sales forces.

Oddly enough, this increased computer vendor activity in the impressionable

kindergarten through grade 12, or K-12, market comes at a time when the U.S. education market is stagnating in terms of student population and has seen thousands of its teachers leave their jobs through attrition and frustration.

An aging baby boomer population and a decline in the birth rate have closed or consolidated many U.S. schools in the past five years, creating criticism about an increasing student/teacher ratio, which many say leaves teachers overworked and overburdened and students without adequate instruction.

Add a number of dire predictions about the U.S. educational system, fueled by some well-publicized research reports that point to the decline in student literacy and knowledge in math and science, and you have the sense of a system in a tailspin.

Controversial reports are sending shock waves through the educational establishment and have focused more attention on computers and other technologies as tools that can help stem this supposed downward spiral in U.S. education and get it back on track. (Most recently, a report issued by the National Assessment of Educational Progress, an arm of the Princeton, N.J.-based Educational Testing Service, indicated that computer literacy among U.S. students, especially minorities, is low because of a lack of access to computers.)

Therefore, even though many U.S. school budgets have leveled off, computer vendors are feeling more pressure from educators to provide packaged micro-computer systems and innovative courseware to help

teachers and students.

"In the past couple of years, school interest in technology has increased a great deal," explains Wallace Feurzeig, a division scientist at Cambridge, Mass.-based Bolt Beranek & Newman, Inc., a consulting and software and communications development firm. Feurzeig was also instrumental in the development of the Logo educational programming language. "The general feeling is that computers now represent a technology that can be responsive to the problems in U.S. education. The major hope now is to turn such technology toward students."

This is a big role — and a potentially lucrative one — for microcomputer vendors to fill. The educational market is lucrative in short-term revenue for sure. But it is the long-term revenue potential that is truly staggering. Such an opportunity presents a chance to cultivate brand-name loyalty at an early age, a loyalty that, perhaps, will carry into adulthood when kids will assume responsible roles in all walks of life. And in many cases, that responsibility will involve purchasing corporate computers.

"On the one hand, we [IBM] are concerned, as are other U.S. companies, about the capability of the U.S. labor pool 20 years down the road," explains Charles E. Steele, area manager of IBM educational systems in New York. "We're worried because the national dropout rate in high schools is nearly 29%. We feel we can do something about that."

But Steele says there will always be two sides to the educational story. There is a genuine, altruistic concern on the part of the computer vendors to produce hardware and software that will help U.S.

Kolodziej is *Computerworld Focus*'s senior editor.

P. CHARLES ADAMCHAK

## MARKETING TACTICS

students and the educational system overall make positive strides forward. There is also the cold business reality of making sales, increasing market share and knowing that if the seeds of brand loyalty are planted early enough, a future harvest of large revenue is almost assured.

"Let's face it, we want to help

these teachers and kids," IBM's Steele says, "but we also don't want kids growing up on Apple Computer, Inc. machines."

According to William Gattis, director of the Radio Shack Education Division, a part of Fort Worth, Texas-based Tandy Corp., "It is a very competitive [educational] market that is going to become tougher. You're

aiming to carry brand name and recognition as far as possible through the school years and beyond."

**Competition in the ranks**

It is a tough market for Tandy and for IBM and, for now at least, still a sweet one for Apple. As of June 1987, Link Resources, Inc., a research firm

based in New York, placed Apple with a commanding 59% of the U.S. K-12 educational market, with Tandy at 16% and IBM at 11%. That might not sound like a lot for IBM, but an 11% market share represents a big boost from IBM's 7% showing in 1986, with the shares of the other two vendors having basically remained static.

"1986 was a turnaround year for IBM," explains Natasha Thompson, a research analyst at Link. "That's the year IBM started solidifying its position in the K-12 market."

In fact, 1985 was the year that IBM really started concentrating on the promising K-12 area, which has been a virtual Apple fiefdom since the mid-'70s. It was in 1985 that IBM created its Educational Systems Division, revamped its educational sales staff and began pumping a lot of research and development money into the mar-

**"Let's face it, we want to help these teachers and kids, but we also don't want kids growing up on Apple Computer, Inc. machines."**

CHARLES E. STEELE  
IBM EDUCATIONAL SYSTEMS

ket. The company was reportedly taking dead aim at Apple.

IBM was well aware of the reports that were casting a shadow on the U.S. educational system and used them as starting points in rejuvenating its educational strategy. After pinpointing apparent educational weaknesses, the firm worked both in-house and with third-party software vendors to plug the gap.

At the same time, IBM launched a program in which it hired teachers and top U.S. educators from school districts on both full- and part-time bases to consult with IBM staff about the most needed software in U.S. schools. Recommendations centered on tools to improve proficiency in the basics — writing, reading and the sciences. According to IBM sources, there are apparently up to 300 such educator-consultants currently under contract at IBM.

This strategy has paid off. To answer the growing concerns about student illiteracy, IBM hired well-known educator and consultant John Henry Martin to put together a program for child literacy, called "Writing to Read," and for adult literacy, called "Principle of the Alphabet Literacy System," or "PALS." Both have helped IBM make inroads into Apple installations.

IBM's study of software needs in schools brought about the introduction of a key innovation, initially into the PALS program, called Infowindow.

Infowindow is a system that basically consists of an IBM Personal Computer AT, a videodisk player and a touch screen. It combines graphics, picture and audio from the videodisk player to add more interactivity into the



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## MARKETING TACTICS

learning process. IBM says it plans to carry Infowindow into the high school levels as well.

"So far, it seems that IBM is doing everything right," explains Jon David, a consultant and member of the New York Personal Computer (NYPC) users group, which has an ongoing interest in the educational market. "IBM has identified weaknesses in existing educational software, which is predominantly Apple based. IBM has become aggressive in its sales, and its sales representatives seem to be at every educational get-together. It has also become aggressive in its hardware discounts. IBM means business."

Apparently, Jim Dezell, IBM's general manager of the Educational Systems Division, says the company has been offering up to 40% discounts on Personal System/2 Models 25 and 30, the two offerings IBM is now actively promoting in the K-12 market. IBM also offers software discounts between 20% and 30%. Unwilling to divulge actual figures, Dezell does admit that IBM's educational sales force has been "increased substantially" in the last year or so.

Though Dezell denies that IBM's aggressive discounting has been squeezing sales margins for its dealers and that IBM has initiated a price war in a market that he claims has always seen substantial discounts, it is difficult to conceive that hardware prices can dip beneath an already bedrock low of 40%.

"I know that some [New York City] computer dealers are hard-pressed to match the big discounts that IBM is offering the educational market," explains Steve Levenson, director of marketing at Hertz Computer Corp., an IBM Personal Computer-compatible firm in New York. "One dealer I know went to a 43% discount. There are no margins left. It's a squeeze tight."

#### Little headway by clones

Unlike the commercial business market in general, the educational market has apparently seen little headway made by IBM PC-compatible and clone makers. But there are exceptions. Tandon Corp., a Chatsworth, Calif.-based IBM PC-compatible maker, for example, was recently awarded a large contract to supply Microsoft Corp. MS-DOS-based personal computers to New York City schools.

And then there is Cordata Technologies, Inc., a Newbury Park, Calif., PC maker that was recently taken over by Korea's Daewoo Corp. Cordata is introducing a unique approach to the educational market — a micro that is a built-in clone of both the Apple II and the IBM PC. That way, Cordata figures, it can cover with one fell swoop most of the major educational software now on the market.

"The educational market is a complete-package market," Levenson explains. "You need specialized software and extensive service and support. Not too many players can do that."

While it appears that the top three players in this market for the foreseeable future are Apple, IBM and Tandy, most analysts say they think the big battle will be between Apple and IBM.

"IBM is going straight after Apple," says analyst Thompson of Link. "IBM wants to replace Apple as the major vendor in the K-12 market, and they've set 1990 as the year it will be done."

Though IBM officials deny such a strategy exists and especially deny attaching any significance to the year 1990, that date seems to be making the rounds as the watershed year for IBM in the education market.

The key will be software. Forget about OS/2 in the K-12 market, Dezell says. It is too difficult and expensive to write software running under OS/2 for the K-12 level.

With computer hardware, however, do expect to see dealers plugging IBM's high-end Micro Channel-based PS/2 Model 60s and 80s into networks as file servers supporting Model 25s and 30s, Dezell says. This strategy apparently makes sense because it would counter Apple's plan to migrate many of its high-end Macintosh IIs as servers into Appletalk networks in the K-12 market.

"We're starting to see more Macintoshes in high schools," says Katie Povejil, manager of Academic Solutions at Apple. "The Macintoshes have built-in Appletalk protocols." Networking Macintoshes together, Povejil explains, simply requires plugging network cable into their ports. In the meantime, Apple has extended the protocol to Apple IIE and Apple IIGS machines, Apple's K-12 bread-and-butter systems, so they can become part of the Appletalk network using Macintoshes as file servers.

Microcomputer hardware, though still important, is becoming little more than a platform from which to launch all-important educational software. In this regard, the educational market is no different from the commercial PC market in which software is now driving hardware sales.

"The [educational] market has changed every few years," explains Tandy's Gattis. "In the late '70s, schools were buying hardware and buying wildly. Then came an emphasis on educational software, but it was piecemeal. By '83 or '84, computer literacy became a big concern, but students wound up using word processing packages and other programs that really only mimicked the way we write."

"The whole emphasis now is toward curriculum-based soft-

ware, coordinated with print materials — basically, an instructional management approach," Gattis says. "We're a hardware-driven company, but we've long recognized that software is where it's at in this area."

According to Tom Harris, supervising teacher at the Playing to Win Computer Center, which runs a computer literacy program in New York City, the best educational software is a tool that enables greater interaction between students and programs.

"If the students can define their own progress, can help set

IBM is creating educational products that are so far superior that they will be in demand in spite of existing commitments."

A spokesman at the Bronx Technical Assistance Center in New York claims that although Apple systems proliferate in New York City schools, IBM has made headway, "especially with its 'Writing to Read' programs, which now have about 100 labs in New York City."

Apple is hardly standing still, however, in the face of apparent IBM gains.

"We've been ramping up [in

sil says. "That's being reflected in our educational software."

And Tandy's Gattis warns vociferously against counting his company out. Tandy, Gattis says, has spent years establishing cooperative software development and marketing efforts with major educational publishing houses such as D. C. Heath & Co., Houghton Mifflin Co., McGraw-Hill, Inc. and South-Western Publishing Co.

"We customize our educational software and handle nationwide workshops for educators," he explains. "We get input from educators and publishers on how to design educational software. It keeps us in touch with the real market, and we've been doing it since 1979. So you could say IBM has been following our lead."

Gattis adds that Tandy has also traditionally been strong in its network products, and networking is assuming an important role in finalizing sales to educational school districts.

"Networks have many benefits in a learning environment," Bolt Beranek's Feurzeig explains. "It changes the behavior of teachers. Instead of always lecturing at kids, teachers can now observe and listen to students. It makes for a much improved engagement between the two."

Although networking computers is becoming essential in schools, Link's Thompson estimates that only about 10% to 13% of U.S. schools currently have networks installed.

With all this computer activity, it might seem that the K-12 computer market in the U.S. is taking off. According to Thompson, however, research indicates that during the past few years, the average amount spent on computer hardware and software by public and private schools at the K-12 level has barely risen. This finding points out that many budgets in U.S. school districts have been static when it comes to monies allotted for computer purchases. And that means that vendors are going to have to fight harder for every education dollar.

This situation also means that the sales ground between Apple and IBM is likely to get bloody. The days when IBM and other vendors could dismiss Apple as a glorified toy maker are long gone. With the Macintosh becoming a success in U.S. business and universities, Apple now stands to solidify a clear line of loyal users from kindergarten right into the Fortune 1,000, a line that IBM would no doubt like to help change to shades of blue.

As Harris of the Playing to Win Computer Center says, "If IBM leaves the 7-year-olds [alone], then 11 years from now, when these kids go out into the business world or into college, they'll just leave IBM alone." ♦



**The educational market presents a chance to cultivate brand-name loyalty at an early age, a loyalty that, perhaps, will carry into adulthood when kids will assume responsible roles in all walks of life. And in many cases, that responsibility will involve purchasing corporate computers.**

the parameters of the program, then that's a good learning tool and the best kind of educational software I've found," Harris explains. "I think only about 10% of the current educational software meets those criteria, but the numbers are increasing."

Dezell, in fact, claims that educational software is into its second generation. "Much of the educational software produced in the '70s and '80s was piecemeal, uncoordinated," he says. "Now the aim is to provide total solutions to specific problems such as illiteracy and poor math and science comprehension."

If software is, indeed, the key to the educational market, then IBM might be doing a good job with its homework.

"There are thousands of [educational] programs out there for Apple computers," David of the NYPC users group says, "but I have to tell you that from what I've seen, the IBM software is much better. Even though IBM is facing educational facilities with large investments in existing hardware, software and training from other vendors,

education] ever since the Mac was introduced," Povejil claims. She points out that there are increasing numbers of educational programs being produced that are based on Hypercard, Apple's software methodology in which multiple levels of information are available via an icon-based interface and in which software developers and students are encouraged to program. Povejil adds that Claris Corp., Apple's recently created software division in Mountain View, Calif., is also in the process of producing innovative software for the education market.

Del Yocam, Apple's chief operating officer, has been busy campaigning for Apple in academic circles and demonstrating Apple's new compact disk/read-only memory player that, when teamed with a Mac running Hypercard, can be programmed with a combination of text, images and sounds and is a direct answer to IBM's Infowindow.

"The fact is computers have become powerful enough to produce paradigms of learning, and not just parody systems," Povej-





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# Deciphering the PS/2

## *MIS holds out for answers*

BY JOHANNA AMBROSIO

**A** first birthday should be a time for happiness over accomplishments achieved and promises of dreams to be fulfilled. But for IBM's new generation of personal computers, April marked a bittersweet first year. Although the Personal System/2 family has set sales records, customers have not adopted the technology as quickly or as completely as the company had hoped.

While many of the largest user organizations have committed to the PS/2 as their strategic desktop workstation of choice, the majority of these companies are only slowly adding the computer to their existing

information systems arsenal. Outside the Fortune 100, most companies have a limited number of PS/2s in house to experiment with, and still other firms have decided not to use the PS/2 at all.

Most of the PS/2's drawbacks concern the fact that many of its benefits are promised rather than real: Software that takes advantage of the PS/2's architecture is not yet available; the OS/2 operating system and its piecemeal release schedule is confusing; and cost and conversion factors are keeping users from wholesale commitment to the technology.

Says David Grossman, financial manager in Ernst & Whinney's New York office, "I don't know too many companies that are adopting the PS/2 en masse. I don't see the revolution." Instead of providing quick fixes to today's problems, the PS/2 and OS/2 are long-term directions for the majority of user organizations and the industry in general.

But by at least one criterion, IBM has already achieved a stunning measure of success — some two million PS/2s were sold the first year, according to its figures. In contrast, 180,000 of the original IBM Personal Computers were sold the first year.

However, at least some observers say that there may be a slowdown ahead. "The first wave of corporate buys is over," says John Murphy, an independent consultant in Cherry Hill, N.J. "Now it's hard-sell time."

Dick Gouth, manager of PC product line evaluation at IBM's Entry Systems Division, disputes that view. "I don't agree the first

wave is over. The second million occurred even faster than the first million, and that, to me, says shipments are not slowing down." He further notes that as of late last year, the majority of PS/2s sold were the higher end Models 50 and above.

Another marked difference between the original Personal Computer and the PS/2 is in the strategy IBM now espouses for desktop computers — indeed, that there even is a strategy. Back in 1981, IBM executives have admitted, the company wasn't sure how customers would use the PC, if at all. The whole PC effort was an experiment, and in fact, the company drastically underestimated demand for the original PC. Back then, IBM was almost exclusively focused on mainframes and had little idea of

what the PC would mean for users, the industry or its own long-term direction.

What a difference six years can make. This time, the strategy has been carefully thought out, and IBM designed the PS/2 architecture to reflect the changes. "There have been enough changes in usage patterns to call for a redesigned bus," Gouth explains.

The original PC was intended for stand-alone personal productivity applications like word processing and spreadsheets, he says, where today's PCs are used for complicated and resource-consuming tasks like communications with other personal computers or with hosts. "Imagine a PC used as a file server for communications to the host. The amount of traffic going on inside the PC is very heavy," Gouth says.

The PS/2 was designed to handle the increased activity.

Other new demands on PCs include the ability to run more than one application at a time and to share data, printers and other system resources. "Today's environment is more demanding and requires much more performance, storage and memory," Gouth says.

So IBM developed the PS/2 and its companion operating system, OS/2, to take users into a new generation of performance and applications.

As a response to changing customer requirements, IBM's own view of PCs has changed. The desktop machine is now considered by IBM to be one of three computing tiers inside an organization, the other two being mainframes and minicomputers.

"With the PS/2, IBM is attempting to provide alternative platforms for a certain



Ambrosio is a New York-based free-lance writer specializing in business and technology.

MIKE MCGLAUGHLIN

## TECHNOLOGY WATCH

amount of distributed processing," according to Marc Sokol, executive vice-president of Chicago-based software vendor Realia, Inc. "This will allow customers to choose technology based on their business requirements instead of having to fit their business requirements to the technology. Applications will run across all three platforms."

**Three-tier consistency**

In fact, the PC has become so important in IBM's view of the world that it is now part of the Systems Application Architecture (SAA), the company's grand scheme for providing portability of applications and a consistent user interface across all three computing tiers. The PS/2 and OS/2 were the first portions of SAA to be released.

To ensure that the PS/2 can handle these new chores, IBM equipped it with much more horsepower and capability than the older generation had. Even the smallest PS/2 member, the Model 25, is twice as fast as the original PC. And although the older generation has an internal memory of 640K bytes maximum, the PS/2s can handle up to 16M bytes. That allows for many more applications to reside in memory. Disk storage, too,

has increased from an average of 20M bytes on the older models to a maximum of 628M bytes on the new ones.

New rigid 3½-in. diskettes hold up to 1.44M bytes of data vs. the 360K-byte limit on the older machines' 5¼-in. floppy diskettes. And although a conversion effort is needed to get data from the old format into the new one, the 3½-in. diskettes are said to be longer lasting and less likely to surrender to man-made disaster than the old diskettes, which had parts of their recording surfaces exposed.

Much of the PS/2's advantage comes from its Micro Channel architecture. Not only does the 32-bit bus provide better throughput, IBM says, but other pluses include a built-in graphics capability that is more sophisticated than that of the PCs. Also, the PS/2s are reportedly easier to install and more reliable than the older generation. And the PS/2 enables multitasking.

These benefits, however, are only possible in the three PS/2 models that have the Micro Channel — the Models 50, 60 and 80. The two lower end models — the 25 and 30 — are based on the original PC architecture.

Helping the PS/2 provide these benefits is OS/2, devel-

oped jointly by IBM and Microsoft Corp. and introduced with the PS/2 in April 1987. OS/2 and PS/2 work hand-in-hand to provide the new generation's speed, performance and memory advantages.

But OS/2 has an even bigger responsibility — to ensure consistency across all applications through a user interface called the Presentation Manager. The interface includes a series of pull-down menus and icons that represent different functions — a trash can to delete a file, for example. The fact that the software that runs under OS/2 must use the Presentation Manager will bring about a new genera-

Corporate Software, Inc. Although OS/2 will not likely become the dominant operating system before the early 1990s, many observers say it will allow for the development of new types of applications that haven't been thought up yet.

In fact, two classes of software have already begun to appear. One is server software, applications that sit on a PC that acts as a server to other connected PCs. These applications provide services such as document distribution, data base queries, communications routing and so on. The SQL Server, from Microsoft and Sybase, Inc., is one such example.

**Most of this first wave of OS/2 software are "quick ports," tools that mimic the functionality and style of Microsoft MS-DOS-based software but that don't take advantage of specific OS/2 benefits like multitasking.**

tion of easy-to-learn and easy-to-use software, believers claim.

And that's not all. "OS/2 will provide better and faster applications," says Mort Rosenthal, chairman and chief executive officer of Westwood, Mass.-based

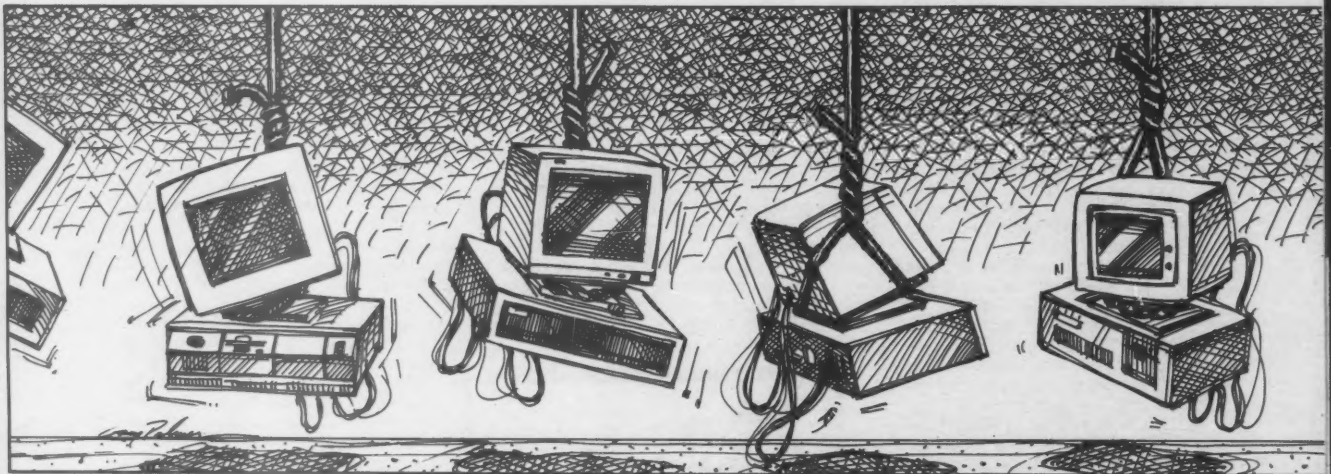
This new breed of emerging software also includes so-called "groupware," such as Lotus Development Corp.'s Notes program. Notes was one of the very first packages designed from the beginning to work with the PS/2

and OS/2 and is intended for groups of people working together, not individuals working alone. Notes is due in 1989, and more packages like it are expected from Lotus and others.

In fact, many software developers have already committed to OS/2, and there are more than 100 packages already available for the system. These tools include Ashton-Tate Corp.'s Dbase III data base management system, Aldus Corp.'s PageMaker publishing software, Wordperfect Corp.'s Wordperfect word processing software, Thinktank, an outline-based business productivity program from Symantec Corp. and languages and tools for development work. More OS/2 packages are coming out all the time.

The problem, however, is that most of this first wave of OS/2 software are "quick ports," tools that mimic the functionality and style of Microsoft MS-DOS-based software but that don't take advantage of specific OS/2 benefits like multitasking. True OS/2 software — much of which will be MS-DOS written specifically for OS/2 — isn't expected to appear until late this year or early next year.

The lack of OS/2-specific software, in turn, has kept users



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## TECHNOLOGY WATCH

from switching to the new platform. According to an assistant MIS manager for a Northeast services firm, who asked not to be identified, "I haven't seen enough justification to bring in the PS/2 or OS/2. The value is promised, not delivered."

The reason it is taking a while for enough software to be developed to entice users is because OS/2 has a complicated and drawn-out delivery schedule and possible conflicting versions. Both Microsoft and IBM will introduce versions, which may or may not be similar.

Other manufacturers, including current PC providers, are offering their own OS/2 versions that are as like IBM and Microsoft's OS/2 as Compaq Computer Corp.'s Compaq operating system is to IBM's PC-DOS.

The first version of OS/2, Standard Version 1.0, has been available from IBM and Microsoft since December 1987. IBM's Extended Edition, Version 1.0, is scheduled for availability in July. This version will have all the functionality of the current OS/2, plus IBM's Database Manager and Communications Manager.

IBM says the Database Manager, based on the same technology as IBM's DB2 mainframe

data base system, will provide a mechanism for handling requests to and from data bases that either reside on the PC or are on other machines. The Communications Manager will reportedly enable PCs to share data with other PCs or with mini-computers and mainframes.

**Indirect competition**

In the meantime, Microsoft is already shipping its own LAN Manager to developers, although the firm says it does not plan to introduce a full-blown Extended Edition to compete directly with IBM's. Instead, according to a spokesman, Microsoft will concentrate on providing building blocks to other vendors, which will be free to use them as they wish. How much IBM's Communications Manager and Microsoft's LAN Manager will be alike is anybody's guess.

After IBM's Extended Edition 1.0 hits the streets, Microsoft is expected to announce its Version 1.1 of the Standard Edition in October. This version is said to include the Presentation Manager and is already being sent in beta form to developers. IBM says it will include the Presentation Manager in OS/2 Extended Edition Version 1.1,

which will be out in November.

Finally, in 1989, a Microsoft OS/2 version that was specifically developed to work with computers based on Intel Corp. 80386 chip technology will appear. Prior to that point, OS/2 will work on 386-based machines, but it will not exploit their special features, such as the ability to run more than one MS-DOS application at a time or provide really fast speed. It is not clear whether IBM will also provide a 386-based OS/2 version.

Such confusion over the OS/2 delivery schedule is enough to keep even the most technology-prone users away from OS/2. According to Susan Nurse, OS/2 product manager for Informix Software, Inc. in Menlo Park, Calif., "A lot of users will hold off until all the pieces are there. We don't see it becoming the dominant operating system until 1990 or 1991."

There are other problems, which include the cost of adopting OS/2 and converting software. Then, too, as more PS/2 clones appear — and as IBM continues to introduce new PS/2 models — prices will drop. This expectation, as well as the continued improvements promised for the MS-DOS product, might be causing some users to wait

awhile before buying.

Cost factors for buyers include memory. OS/2 requires approximately 3M bytes to run — 2M bytes for the operating system and 1M byte for applications. Early indications are that IBM's Extended Edition will need 6M to 8M bytes. This means users will have to add extensive memory to the older generation of PCs for them to run OS/2. Even the PS/2s might not have enough memory in their standard versions to accommodate the operating system; the Models 50 and 60, for example, come standard with only 1M byte of memory.

**Conversion pains**

Software conversion from the 5¼-in. to the 3½-in. disk formats is another time and money investment potential buyers will have to keep in mind. The conversion process continues to be "a pain in the ass," according to Corporate Software's Rosenthal. "You really have to be careful when you order software to make sure it's in the format you need." With the mixture of old and new computers that many companies have, the switch can be a problem indeed.

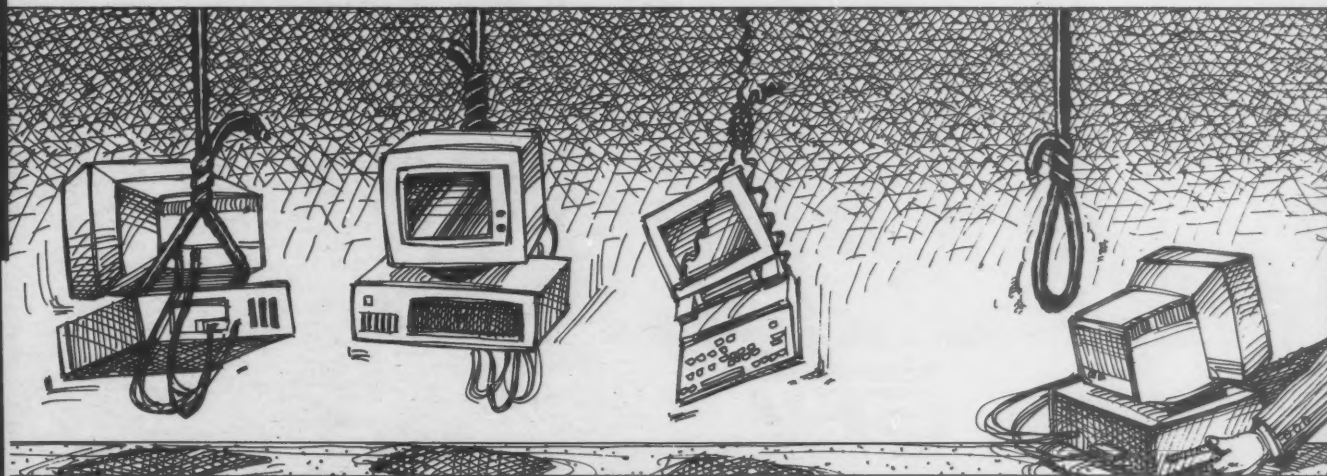
In addition to the software acquisition issue is the problem of

converting all the user-generated data that already exists into the new format. Leslie Fiering, assistant vice-president of Banker's Trust in New York, says that "the conversion issue was bumpy, but we did a fair amount of up-front work with products like Laplink from Traveling Software, Inc. in Bothell, Wash., and Brooklyn Bridge from White Crane Systems in Norcross, Ga., and external drives, and we minimized the pain. [But] it's still an inconvenience."

And then there's the cost of the operating system itself. The current Standard Edition 1.0 sells for \$325, and IBM's Extended Edition will go for \$795.

As far as the clone question goes, PS/2 look-alikes have already been introduced by Dell Computer Corp., Tandy Corp. and Acer Technologies Corp. The machines are scheduled for availability this summer.

And other machines are waiting in the works from vendors such as Chips and Technologies, Inc. in San Jose, Calif. The machines haven't yet been formally introduced, because companies are waiting to see how the legal situation evolves. IBM has applied for patents on the PS/2, but the patents have not been granted, so companies don't know yet



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## TECHNOLOGY WATCH

what parts of the technology are protected. IBM has already served notice that it will come down hard and swiftly on anyone who infringes on the patents and, as an extra disincentive to knockoffs, recently raised its license fees from 1% of revenue to 5%.

Still, when the clones do hit the streets, they will likely put even more price pressure on the PS/2 line. Prices of the IBM machines have already fallen between 15% and 20% since their debut, consultant Murphy says, even though IBM has not formally lowered prices.

Prices for the current crop of PS/2s will take more of a beating when IBM comes out with a second round of processors later this year. IBM Entry Systems

Division head William Lowe told a February analysts meeting that IBM plans to introduce 11 PS/2s during the second year of the computer's life. These products will maintain the current PS/2 price points but will add functionality, he said.

#### "Look and feel" monkey wrench

Still another factor has thrown a monkey wrench into the works. Apple Computer, Inc. in March filed suit against Microsoft and Hewlett-Packard Co. The suit alleges that Microsoft's Windows 2.03 and HP's New Wave interface, which is based on Windows, infringe on the "look and feel" of Apple's Macintosh computer. Because Windows is the forerunner of and basis for the Presentation Manager, many indus-

try watchers suspect Apple's real reason for filing suit is to stop Presentation Manager development work.

That tack does not appear to be working. Both IBM and Microsoft are proceeding with OS/2 and Presentation Manager development work on schedule.

In addition to these stumbling blocks, many users simply don't want to switch to OS/2 because they get all the functionality they need from MS-DOS and the current generation of PCs. "It's a major task to switch over," Ernst & Whinney's Grossman explains. "And quite a number of end users have trouble dealing with what they currently have."

Even shops that have acquired PS/2s, such as Banker's Trust, are proceeding

slowly. "We're replacing the old machines as they would naturally be upgraded," Fiering says. "We haven't gone through a major swap." Even so, she adds, it hasn't been easy for the firm. "One of the reasons you have standards is to simplify training, installation and the rest. By including the PS/2 in the standard, you lengthen that process." Nevertheless, the company, which has a large number of PS/2s, says that maintaining compatibility with IBM is important to its long-term direction.

Other organizations, such as UBS Securities, Inc. in New York, a wholly owned subsidiary of Zurich-based Union Bank of Switzerland, have "decided worldwide not to buy PS/2s," says Brian Livingston, UBS Securities' assistant information systems manager. "We have about 2,000 PCs that are or are about to be connected worldwide via X.25 boards that we had some custom work done for. If we go to the PS/2 architecture, none of those boards would work."

Users are finding their own ways through the muddle of OS/2 and PS/2, and it appears they have at least two years in which to figure out their strategies. Helping ease the burden is the knowledge that MS-DOS will continue to be enhanced and supported, according to Microsoft. Future MS-DOS enhancements Microsoft has promised include the ability to handle larger capacity storage drives, high-resolution displays, added speed, ease-of-installation and ease-of-use features. Microsoft will also attempt to provide closer links between MS-DOS and OS/2.

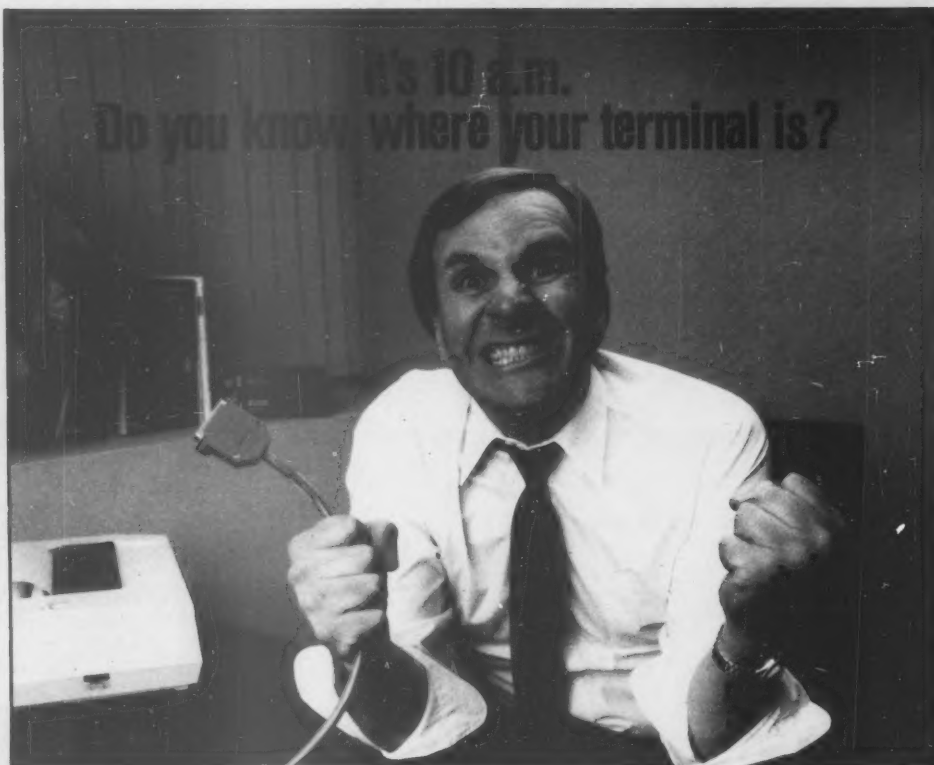
#### DOS defies death notices

"DOS will not die," Realia's Sokol claims. "It's very much like the mainframe world with DOS and OS. People thought for years DOS would die, but it hasn't." Most applications vendors have promised continued support into the future. And that goes for IBM as well; the same day OS/2 was announced, IBM introduced Version 3.3 of its PC-DOS.

Consultants are advising that the most critical factor is "to just get 386 computers, whether they're PS/2s or not," industry analyst Esther Dyson says. "You'll be taken care of either way."

Another guinea pig that users might want to consider is how closely their PCs are tied to IBM's mainframe and mini-computer architectures; the answer may well determine the need for PS/2s or clones. The tighter the integration to IBM's large systems, the more the need for the PS/2 vs. some other 386 machine. IBM, between its Extended Edition of OS/2 and its proprietary PS/2 architecture, will provide its own customers with increased functionality in areas like integration and communications that they will probably not find elsewhere. But if a user is using PCs to communicate only with other PCs in a local-area network or as stand-alone devices, the need for all-IBM gear becomes much less important.

Even more crucial than the PS/2, according to some users, is the long-term question of how to assimilate all the technology. "We're currently studying the question of what kind of PCs to deploy where," says the Northeast services firm's assistant MIS manager. "We're trying to decide where to put the [Intel] 8086 and 8088 machines — they seem to work fine in administrative areas — and where to put the [Intel] 286s and 386s. That's our most pressing issue now." ♦



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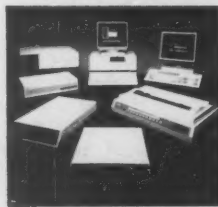
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# Rock 'n ROM



BY DANIEL GROSS

**T**he impact of CD-ROM on information systems cannot hold a candle to the personal computer — yet. PCs have created the philosophy of decentralization and distributed processing that characterizes modern information systems. But compact disk/read-only memory (CD-ROM) technology may hold greater promise. Some industry observers, and a surprising number of MIS executives, go so far as to say that CD-ROM is “a mainframe on a disk.”

Microsoft Corp.'s third annual CD-ROM conference in Seattle entitled “The Industry Emerges” was the

occasion for a number of significant announcements. Apple Computer, Inc.'s CD-ROM drive was shown there for the first time, and Tandy Corp. announced an agreement to distribute Hitachi Ltd.'s CD-ROM drive through its thousands of Radio Shack retail outlets.

While this news may sound more relevant to the educational and small-business/professional markets, both are telltale signs of the importance CD-ROM vendors are giving the MIS marketplace. Apple's publicly stated strategy is to expand its foothold in the corporate market with its Macintosh microcomputer line. Its CD-ROM drive is as important to this strategy as it is to the company's determination not to lose

ground to IBM and others in the education market.

Likewise, Tandy's decision to make the Hitachi drive available through all its outlets, rather than just its specially equipped and staffed computer sales centers, can be viewed as an attempt to give CD-ROM technology the exposure that may lead to volume purchases.

According to a market research survey conducted by Philips and Dupont Optical Co. in Wilmington, Del., 32% of MIS managers are investigating CD-ROM as a possible solution to their internal data distribution problems. While this number sounds high, the survey goes on to point out that fewer than 1% of these managers have actually begun to implement in-house CD-ROM applications.

There are three key variables to consider for cost-justification of CD-ROM technology: the amount of data to be distributed, the frequency

of updates and the number of recipients. Although some critics of CD-ROM — especially vendors of dial-up information services — claim that the medium is ill-suited for frequently updated information, the ability to edit existing CD-ROM masters quickly could make this a moot point.

Another important distinction is the three categories that define MIS responsibilities for information management: data coming into an organization, data that leaves the organization and movement of data within the organization. CD-ROM shows promise for all three applications in cases in which many megabytes need to reach many people.

For incoming information, the problems are access and lack of standardization. The variety of media (such as mail, on-line data bases, photographs and so on) and the variety of formats within each medium (such as publication sizes,

Gross is chairman of Magnetic Press, Inc. and a director of the Magnetic Press Editorial Network, a New York-based press service specializing in emerging information technologies.

*Disks a hit with MIS  
for internal data distribution*

## CD-ROM OUTLOOK

which can range from tabloid to 9 in. by 12 in. or other dimensions) make any kind of coherent retrieval difficult.

Some managers dream of CD-ROMs turning trade periodicals into easy-to-use reference materials. "I would love to get CD-ROM with copies of all the periodicals I read with a hypertext front end. I could easily produce a Hypercard indexing system, but it would be very expensive for me to enter all the text that interests me," says Michael

prototype on CD-ROM will come up in December," he claims.

CD-ROM came up as a desirable solution for Cummins Engine by the process of elimination. It was the only reasonable-cost way to distribute image data for the firm. "It's not economically feasible to put this on the mainframe because of the graphics. We had to go with PCs in which graphics are more accessible. We didn't want to convert our 8,500 mainframe terminals

level of technology, and CD-ROM is coming on the coattails of that. MIS will want control over data that is corporatewide, and that's where it will want to control CD-ROM. But I see MIS as the source of CD-ROM long before [it presents] any resistance to it," says Bill Fitler, a senior engineer with Digital Research, Inc., a software development firm in Monterey, Calif.

In fact, from the point of view of managing different versions of documents and releases of internal corporate information, the static quality of CD-ROM data may be a plus. The cost and complexity of current CD-ROM mastering facilities means that MIS will have the process of generating and indexing information well in hand — that is to say, centralized.

But this cost also puts CD-ROM out of reach of the bulk of the market — small- to medium-size businesses. Until standards evolve to lower the cost of introducing CD-ROM technology in an organization, there will be reluctance to invest in even off-the-shelf applications of the technology.

However, the CD-ROM industry has an excellent record of establishing standards very quickly. For example, within a few months of early discussions to adopt a file format promoted by the High Sierra Group (HSG), a consortium of vendors, a de facto standard was in place.

While the HSG format has gone on to become the basis for the International Standards Organization's 9660 standard for CD-ROM file formats, different publishers still use widely varying data indexing techniques. As a result, there is still no search-and-retrieval software package separate from the CD-ROM itself. Such an indexing standard

be used to replace manuals," he says. "We have large manuals for safety procedures for different pieces of equipment. It would be very useful to have that online. But I question whether, for our particular situation in which manuals differ from one site to another, we can justify CD-ROM. We would be happy to go with WORM."

So CD-ROM may still essentially be a solution in search of problems to solve. In a presentation given at the First Pacific Conference on New Information Technology held in June 1987 in Bangkok, Thailand, William Paisley, executive vice-president at Knowledge Access International, a CD-ROM service organization in Mountain View, Calif., made the distinction between technologies that emerge from market demand and those that come out of laboratories. In his talk, Paisley applied a popular historical model to the development of CD-ROM.

Paisley asserted that the three phases of a new technology's life cycle are feasibility, substitution and new functions.

In the feasibility phase, manufacturers prove the technology can be implemented at a reasonable cost. At this point, the need for such a market may remain a question mark.

The substitution phase involves the first applications of the technology in the outside world, usually to replace older technologies. As far as MIS is concerned, CD-ROM is at this stage, offering an alternative to mainframe access, microfiche and paper.

But there is an element of hype in the "mainframe on a disk" concept being put forth. CD-ROM is, to a certain extent, out of step with the development of PC technology. While the

of new applications are raised simply by the disk's ability to store multimedia data bases combining text, data, sound and video. As the competition between Philips' compact disk interactive (CD/I) and General Electric Co.'s digital video interactive (DVI) comes to a showdown within the next two years, MIS may begin to confront user requirements for just this kind of application.

**CD-ROMs insufficient**

By that time, CD-ROMs may be considered an insufficient storage device. Even with the state-of-the-art compression techniques used in DVI, a 10-minute full-color video sequence requires roughly 100M bytes of disk space. But the problem of storing more than 550M bytes on a CD-ROM disk is a purely technical one, and there is as yet little demand for additional capacity. As interactive full-motion video becomes a more important part of the CD-ROM's contents, the industry can expect to see disks, perhaps double-sided ones, with capacities exceeding 1G byte.

There are already WORM disks that can store as much as 2G bytes, and these are frequently used in jukebox systems providing on-line access to several terabytes (that's trillions of bytes) of data. Thus far, the only users who have expressed interest in these systems are those with sanity-threatening records management problems, such as the U.S. Department of Commerce and the Patents & Trademarks Office.

At the Microsoft conference, flyers circulated by Philips and Sony Corp. described a development termed CD-WO, or compact disk/write once. This technique makes it possible to combine read-only and user-written information on an optical disk the size of a CD-ROM. Unfortunately, the write-once area of the disk uses a different optical method for encoding data and is therefore not compatible with existing CD-ROM players.

This technology will very likely evolve alongside WORM and the new magneto-optical techniques used by 3M Corp. in its erasable optical disk drive recently announced at the Hannover Fair Cebit '88 show in Hannover, West Germany, in March. It is realistic to expect a convergence of these three developments that will lead to intercompatibility of read-only write-once and read/write optical media by the turn of the century.

These technological developments suggest that CD-ROM is an early sign of fundamental changes to come in information management. By the time these changes are widespread, however, the underlying technology will no longer be called CD-ROM. ♦

**"MIS will want control over data that is corporatewide, and that's where it will want to control CD-ROM. But I see MIS as the source of CD-ROM long before [it presents] any resistance to it."**

BILL FITLER  
DIGITAL RESEARCH, INC.

Coleman, coordinator of technical research development for the Aluminum Company of America (Alcoa), an aluminum products manufacturer in Pittsburgh.

Coleman suggests that the power of indexed retrieval would substantially improve — and accelerate — equipment purchasing decisions. It would be much easier to select anything from a hard disk drive to a long-distance carrier if one could retrieve all press mentions of these goods and services at the touch of a button. CD-ROM fits the bill for high-circulation published material — large amounts of data going to large numbers of people.

**Cost-justification for Alcoa**  
How about information that Alcoa generates for the outside world? Can it cost-justify the use of CD-ROM technology? "We have a lot of customers but only a few big customers," Coleman explains. "We've given our big customers on-line access to their orders, but I don't know if we have the 500M bytes of data we need to send them regularly."

While understandable, Alcoa's lack of need for high-capacity information delivery to customers is specific to the business of selling aluminum. Raw materials businesses don't have the variety and amount of information that demands the kind of storage CD-ROMs provide. In other industries, like retail catalog sales, CD-ROM is a very serious contender for automating catalogs, inventory and the like.

William Seltzer, a project manager at Cummins Engine Co., a diesel engine manufacturer in Columbus, Ind., is one of the 1% who have already committed to CD-ROM. "We publish a master price book of information on parts for the company that our field people use to repair engines. It's 60,000 pages of text and graphics. It's been published on microfilm since 1959. We're converting it to machine-readable form on hard disks, and a

to graphics," Seltzer says.

While Cummins will continue publishing its price book on paper and microfilm, the use of CD-ROM will "significantly reduce" the number of copies required on the old media, according to Seltzer. Cummins is using CD Publisher, a hardware and software system from Capitola, Calif.-based Meridian Data, Inc., designed for in-house CD-ROM mastering applications, he says.

At first, the CD-ROM version of the price book will only be used by the firm's larger customers. "When CD-ROM equipment gets less expensive so that small garages and so on can afford it, then [economies of scale will improve]. We're not going to force this down anyone's throat. Our primary business is to sell parts," Seltzer says.

There is nothing high-tech or glamorous about Cummins Engine's data distribution problem or the use of CD-ROM to solve it. "When you can find things without wading through 800 film cards, that's an advantage," Seltzer notes. By using in-house mastering equipment, it is now possible to cost-justify a CD-ROM when only a few hundred copies will be pressed.

"I'm formerly from MIS," Seltzer says. "I've been in systems more years than I care to remember. I have [the current MIS department's] blessing."

And MIS's blessing many times hinges on the important issue of intracompany data flows, the movement of information like training materials, documentation, company policies and so on. While CD-ROM can play a role in very large organizations in which various departments and work groups form a virtual subscriber base, its applications are limited without active MIS involvement. Internal company information is arguably the most rapidly changing — and the most strategically important — of all the information flows.

"MIS is involved in the PC

**Thus far, the only users expressing interest in WORM-based jukebox systems, which provide access to several terabytes of data, are those with sanity-threatening records management problems.**

would allow a single program to work with a significant number of CD-ROMs from different publishers.

Although by comparison the industry of write-once read-many (WORM) optical disk technology is cursed with a plethora of standards, it is an attractive alternative to CD-ROM for internal data distribution. Because there is no mastering process, WORM can be cost-justified for sharing large data bases between as few as two users.

Alcoa's Coleman sees his company's situation in precisely this light. "Most of our data bases are distributed and the files are relatively small. Certainly for maintenance procedures and so on, CD-ROM could

world still waits for a substantial number of IBM OS/2-based applications — not to mention operating systems that fully exploit the Intel Corp. 80386 in top-of-the-line PCs and the Motorola, Inc. 68020 in the Apple Macintosh II — CD-ROM gives a single user access to data bases large enough to tax even mainframes. Microcomputer processing power needs to catch up with the storage power made possible by CD-ROM before MIS can consider the possibilities of the final phase of a technology's life cycle.

Paisley defined the new functions phase as the emergence of qualitatively new applications from an established technology. With CD-ROM, the possibilities

# Executives shift the data balance



BY HELEN PIKE

**P**eople find it hard not to make joking references to Old MacDonald when they come across the acronym E-I-S. But the concept and growing implementation of executive information systems are not child's play. From mahogany row to the glass rooms of data processing, professionals are groping with a new way to use data as companies grapple with a better way to do business.

Later this month, the president of Grumman Corp. will conduct his bimonthly resource and technology meeting. Among the agenda items is an EIS designed by Barbara Mencher, information and personal computer center manager for the corporation's data systems division in Bethpage, N.Y. The meeting represents a milestone for Mencher, who was drawn into designing an EIS via a request from the company's marketing department at the start of 1987.

"They wanted to do competitive industry analysis," explains Mencher, who has worked for the aerospace company for 10 years, three of them in her current position. "They didn't want to go through the traditional data processing requirements."

The marketing department wanted what Mencher calls "an industry information system," but just how the department wanted it set up was vague and left to Mencher. In creating a prototype, she chose the relational data base ca-

pabilities of Information Builders, Inc.'s Focus, an IBM SQL function, and the graphs-producing feature of Tell-A-Graf from Garden City, N.Y.-based Computer Associates International, Inc., all accessible from a PC-based system. She generated dynamic screens with Builders Easel from Woburn, Mass.-based Interactive Images, Inc. The package is co-marketed by Comshare, Inc. in Ann Arbor, Mich., considered to be the oldest EIS vendor in the country.

"We can always make software dance and sing," Mencher says about customizing System W to meet the marketing department's PC-oriented analysis needs. System W is a Comshare product Grumman had for processing large management accounting applications in its IBM VM-based shop.

System W is a thorough, extremely detailed system, according to Mencher. It was seized upon by the data division's business operations staff to "track everything to the last penny," she says, and that got the attention of Robert Myers, data systems division president.

Pike is *Computerworld Focus*'s senior writer.

## *Using EIS in strategic decision making*



Myers had been casting about for a business operating system that would make the unit's operations more readily accountable and more financial in nature. Myers also wanted to do away with much of the paper used in tracking the operations, but the complexity of the marketing project's design and the detail of System W were a bit intimidating, Mencher recalls.

"So we said, 'Fine. We'll do something else for you,'" Mencher recounts. As she had done with the other design projects, Mencher worked closely with Rose Panarelli, an information center consultant with a business degree (and currently at work on a master's in computer science), to come up with an approach that was more executive-friendly.

#### 'Real executives don't type'

That "something else" became a NEC Corp. multisynchronous monitor, which responds to touch instead of a mouse. Mencher put it on Myers' desk and then placed an IBM Personal Computer AT's CPU and keyboard in a vestibule outside Myers' office. In addition to the PC AT's placement and the desktop monitor's touch-screen feature, Mencher did some cajoling to help her boss get over his aversion to keyboards. Myers now owns a T-shirt that reads, "Real executives don't type."

The upshot?

"Now he feels comfortable with working in an automated environment. Now he wants a little more detail; he wants more functions added," observes Mencher, choosing as an example the creation of hypothetical situations, or "what-if" analyses.

"I think it's a real eye-opener to the

executive to get information in a timely manner. It also means that managers can't wait until the night before to put their budget information together. They really have to put their houses in order," Mencher explains.

At Grumman, the EIS is a visual means by which to track performance indicators and to define critical success factors, Mencher says. These will be two of the points made to corporation President John O'Brien, who is under consideration for having a personal computer installed in his office, and to presidents of Grumman's 10 divisions, most of whom don't yet have desktop computers.

"The president wants an overview: high-level data and a phone number of the employee responsible for more information," observes Mencher about what a company president might expect from an EIS. "It's [also] timely for monthly financial reviews, to see them before going into a meeting, so he won't be hearing about them for the first time."

Just designing the EIS for Grumman's marketing group has prompted the finance department and various facilities to rethink the way they approach customer opportunities, she observes, and that thought process will have to extend to the data processing department as well.

"I think [DP] is going to change. Data centers are going to have to take a whole other look at the way they design their systems," she says. "Three years from now, we're going to be putting expert front ends on these PCs so we can do 'what-ifs,'" she says. "We're not going to stop with EIS."

Just when and how EIS got started as a truly identifiable end-user function, or as an industry or even as a market niche

within the larger sphere of office automation is open to interpretation. Many credit John F. Rockart, director of the Center for Information Systems Research (CISR) at MIT's Sloan School of Management in Cambridge, Mass., with coining the EIS acronym in 1982.

At that time, he saw EIS as different from decision support systems (DSS) by its end use and end user. EISs were used by executives to improve managerial planning, monitoring and analysis. DSSs were used by middle management and tended to be more oriented toward models and data analysis.

#### The birth of ESS

Today, Rockart is promoting Executive Support Systems (ESS), a concept he says is an evolutionary and significant expansion of EIS. According to Rockart, ESS covers any routine use of a computer-based system for conducting any business function by an executive, whether on the corporate rung or at the top of a division. The ESS concept includes communications, such as electronic mail, and office-support applications, such as word processing. ESS also means the presentation of data in flexible formats that combine text, numbers and graphics, highlighting trends that might not be noticed in tabular form.

"The electronic revolution has changed why a staff does its job. Now we have response time under a second," he observes.

Rockart's vehicle for changing the EIS acronym to reflect more support functions is a newly published book, *Executive Support Systems: The Emergence of Top Management Computer Use*. He wrote the book along with research assistant

David W. DeLong.

Published in February by Dow Jones-Irwin, Inc. in Homewood, Ill., the 280-page tome has been through two printings and a third is being contemplated as of this writing.

Rockart singles out five key factors that are influencing a company's top-management level to rethink the way it conducts business:

- A company's globalization. The need to manage subsidiaries, particularly those in foreign countries, as a single organization requires more information.
- Personnel cost-cutting, specifically at the mid-management level, which traditionally generates the company's status reports. "We don't know yet where the borderline is between what you can do vs. what your staff can do for you," he says.
- Worldwide use of communications, especially electronic mail, that brings more and diverse information to headquarters.
- Changes in computer technology that are bringing about new and more efficient ways to access and analyze information.
- The pace of that change.

With regard to the last two factors, Rockart also sees a new designation emerging called "information technology" and a class of users appearing called "knowledge workers."

As a result of the changes being brought about by the ESS/EIS movement, traditional DP and MIS professionals are now under pressure from a new class of PC user — the executive.

MIS is "scared to death about failing in the executive suite. It's a bad place to fail because of your career," adds researcher DeLong, who is also a Cambridge-based consultant. "They think: 'It is a highly unstructured project that doesn't fit our

## IBM study: Who uses Profs and how do they use it?

IT WAS ABOUT THREE years ago that executives, managers, secretaries and other professionals at IBM — 153 in all — volunteered for an IBM study at a company development and manufacturing plant in Harrison, N.Y. The study's aim was to track the use of commands accessing mainframe information from personal computers and terminals using IBM's Professional Office System (Profs). The study was conducted randomly for two-week stints during an 18-month period from 1984 to 1985 in conjunction with the University of Colorado.

"The kinds of applications that apply directly to what people do is the value of the program," says IBM's Sam Kublanow, who authored the study entitled "Measurements of Office Systems." Big Blue chose the Harrison plant and its employees because "we wanted to study a site with a fairly mature consistency of using PCs as naturally as you use your telephone."

IBM then went on to identify four primary uses for Profs that it would follow in the study: time management, communications, data and other, including the operation of a system.

Of the percentage of time used on their computers, executives logged 53% in time-management activities, 43% in communications and the rest in

data or other functions.

Managers used computers 35% of the time for time-management duties, 48% for communications and 15% for data.

Secretaries, whom IBM regards as serving the data processing needs of the first two classes of PC users, spent 32% of their time using desktop machines to perform time-management tasks, 41% for communications and 26% for data processing (primarily of text).

The final category of professionals used PCs and terminals 16% for time management, 29% for communications, 42% percent for data processing and 13% for other tasks.

According to A. Donald Rully, IBM's corporate director of information systems, during the course of the study, there was a 9% to 15% drift in use from host applications to stand-alone PC applications. In similar studies at other IBM locations, the findings parallel the Harrison research.

Which applications drove the use of PCs? Spreadsheets and graphics, along with secretarial support work. What was the most influential factor for off-loading from the host? The user-friendly front end of a PC.

Rully himself has had an IBM 3270 Personal

Computer in his executive office in Purchase, N.Y., for three years. It has been upgraded for graphics and storage. Now Rully has a Personal System/2 Model 60 on order. Also, under IBM's Home Terminal Program for its employees, Rully has an IBM Personal Computer XT so he can do work at home and transmit data by modem to his office.

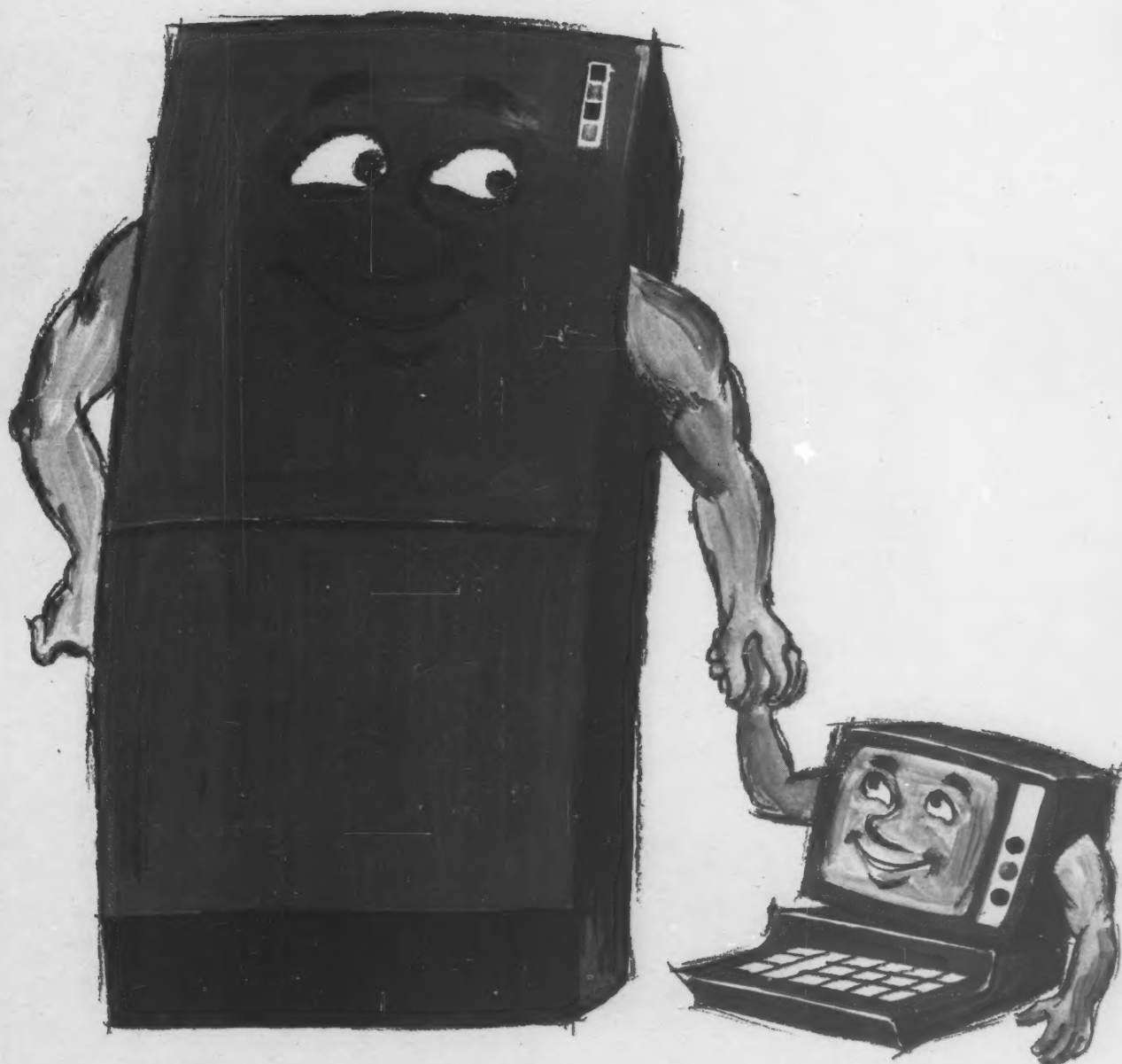
But while Rully took up desktop computing easily enough and with a degree of frequency, other executives were not so quick to adopt the technology, as the study at the Harrison plant found out. This discovery prompted two remedies: better interfaces and training those executives with limited knowledge on how to operate a computer. "We put education programs in place to teach them how to use a broad set of commands," Rully explains.

Because IBM is its own largest customer, it also leverages internal applications for commercial profit. In July 1987, based on its internal observations, IBM added a retention management system to Profs. Simply put, this is an automated feature that holds on to data for a predetermined period of time, then gets rid of it.

Rully concludes, "The integration of the PC with the host to perform similar kinds of work puts the power in the PC." — HELEN PIKE



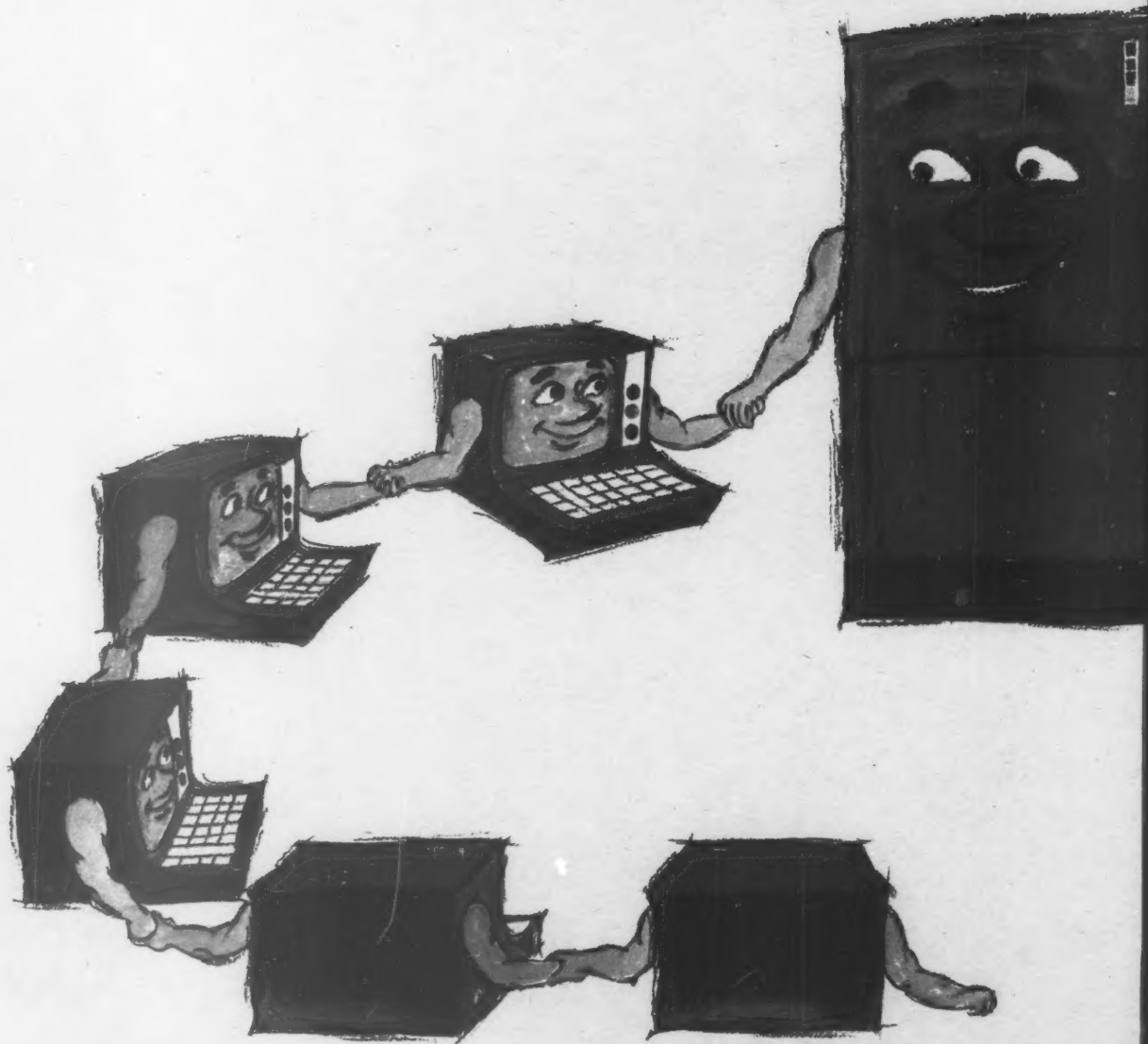
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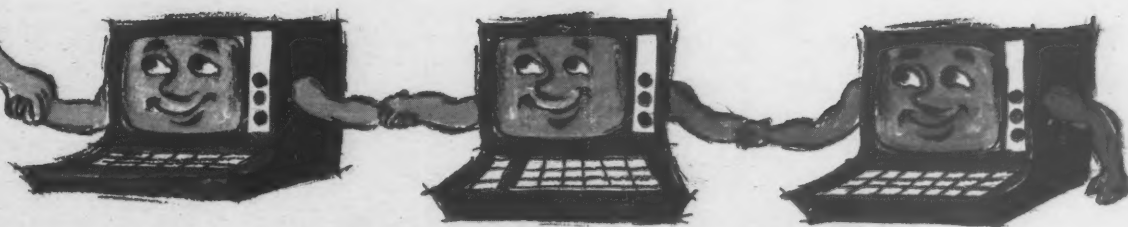
**The mainframe.**

**The PC.**

# PC Integration: the world of



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Almost overnight, the market for personal computers has changed. The individual user no longer runs out and buys whatever strikes his or her fancy.

PC's have grown up, and MIS has taken over responsibility for their role in the corporate information system. "During the past three years, everything has become integration," says Leon Jackson, senior research analyst at Arthur D. Little. "The only computer force that can provide integration is MIS."

The standalone personal computer has become part of a network. And MIS departments are working to set PC standards so that their organizations can benefit from sharing of information, including databases and software.

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## SUPPORT TOOLS

highly methodological role."

Acknowledging that product marketing has already begun to cloud how EIS is perceived and understood, DeLong says, "It's an undefined field without literature or manuals to go about designing these systems. EIS runs counter to the traditional, highly structured application process. It requires minimal planning. It's not cost-justified. There are no systems' specs. And there is rapid prototyping."

And all "from a user you can't say no to," DeLong says. "It means one more application area MIS has to deal with, and MIS is notoriously backlogged anyway."

"The executive suite holds all the cards," he adds, though "often MIS gets caught in the middle between executive

demands for information and the resistance of mid-managers who don't want to let go of the data." The result can often put MIS in an awkward position.

#### No cocktail party

"It's hard finding the horror stories because people aren't going to want to talk about them," says James Tunis, president of Lincoln National Information Services, Inc. in Fort Wayne, Ind. "If it's 10 p.m. and the chief executive officer calls you at home, you know it's not to invite you to a cocktail party. It's because he wants to know where the data is or why you can't manage it more efficiently."

Tunis is one of the more visible proponents of EIS. Featured in the Rockart-De-

Long book, Tunis also speaks publicly about his adventures putting in EISs, whether internally at his company or commercially for new customers. In March, he participated in a panel discussion on EIS at the World Congress of Computing in Chicago.

Lincoln National Information Services is a wholly owned subsidiary of Lincoln National Corp., a diversified financial company. The subsidiary's business plan is twofold: to conduct research and development for internal corporate MIS needs and to create and market hardware and software products for the commercial EIS/office systems market. Tunis, who has been with the subsidiary for 10 years, began implementing an EIS there nine

years ago.

"Our approach here is to give the real end users the power they can use," Tunis says, citing key EIS use as monthly financial statements — reports that used to be quarterly, he adds. Other features include electronic mail and a calendar to track, among other things, Lincoln National Information Services' three corporate jets.

"Our executives needed data not in the data base," Tunis adds, "so we designed an easy system of new data bases to put new data into."

After prototyping in the DP department, Tunis tried the system out on his company's law department before actually implementing it at the corporate level. "We wanted more experience to iron out the mistakes," he says.

A valuable lesson Lincoln National Information Services learned was to pay attention to training support staff. "We found the best way to train middle managers on up was through their secretaries, because they were the least threatening [to managers]," Tunis observes.

#### Drop back ten and punt

The company also changed its terminal screens to make them more readable and reduced the number of keystrokes needed for easier data entry. In the early days, the group went so far as to have wooden cases built to house the terminals, the extreme being a leather-covered terminal that made it look like an old-fashioned football, Tunis recalls. The group doesn't do decorating anymore, he adds.

In 1983, the firm began selling its EIS tool kit that Tunis describes as "wrapped around an E-mail application." The kit allows a developer to write an EIS for top-level divisional executives and above. The EIS includes system support, an expert systems builder, a relational data base manager, graphics, word processing and financial modeling. So far, the Lincoln National subsidiary has sold 170 software licenses of its Office Productivity Network (OPN) to such customers as the U.S. House of Representatives and Senate, Anheuser-Busch Co. and the California Public Utilities Commission.

"Collecting and integrating existing PC software is what we do," Tunis says. His group has a valued-added reseller agreement with Prime Computer, Inc. for its minis. Besides running on Prime computers and IBM Personal Computers and compatibles, OPN also has gateways to Apple Computer, Inc. Macintoshes.

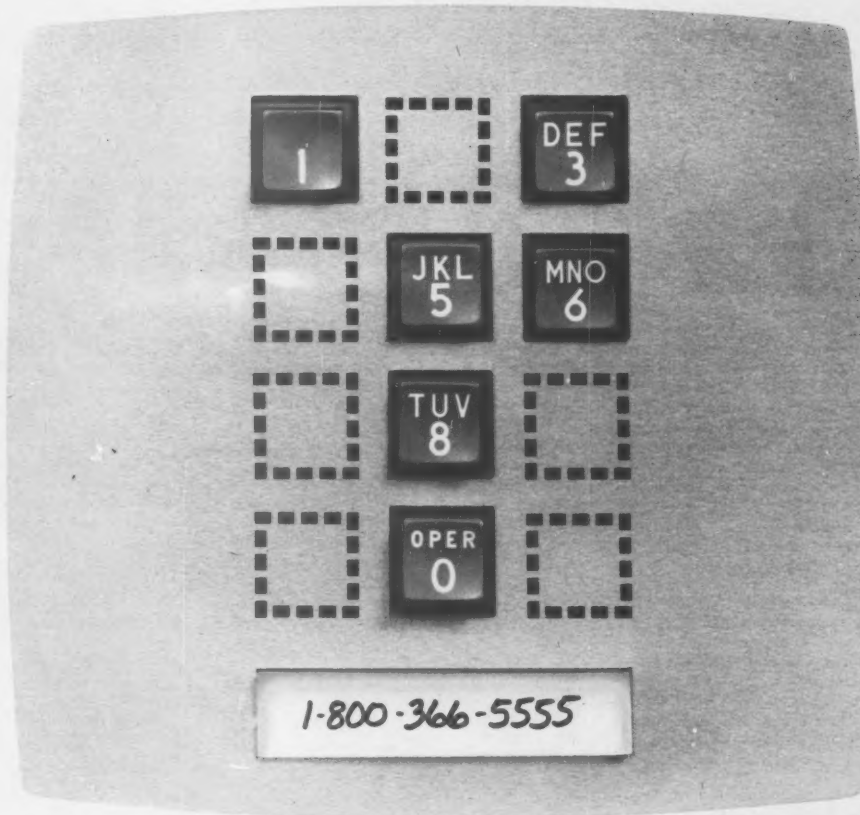
"We're aiming at easy-to-use tools," Tunis says again, with emphasis. Of OPN's estimated 25,000 users, 95% of the executives and 70% of the knowledge workers are "not technically interested" in their systems, he continues.

To get through to those users, Tunis is working on prototypes for interfaces that use English language inquiry, graphics and pull-down menus — all to make a data base easier for an end user to build. Tunis also is planning for a mouse device to facilitate easy data access and manipulation.

Tunis calls this kind of information design a "data store" instead of a data base. "There's just a lot of data that floats around. I call it ad-hoc data — data that comes from the *The Wall Street Journal* that you need right then, but six months later, it's old. It's transient data," he says.

With all the new terms that are being crafted from old MIS labels, Tunis admits that the real marketing of the EIS concept is just getting under way. ♦

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DEBORAH WITNEY-CULP

## AI woos MIS anew

BY MICHAEL TUCKER  
FEATURES EDITOR

**I**t has all the makings of a morality play. It is a sort of rise-fall-and-rise story. The tale starts with a local boy, innocent and talented, burning the midnight oil at universities and corporate research and development laboratories. After much labor, he makes good, but is corrupted by his success. He heads for the

gutter but, in the final scene, is redeemed through the love of a faithful companion — specifically, a personal computer.

These excerpts could be from the Artificial Intelligence Story. Now playing on a PC near you. Critics hate it. They say the work is full of clichés. But ticket sales are brisk.

Although industry observers are berating AI, and former AI market leaders are in serious financial trouble, artificial intelligence on PCs is suddenly a boom market. For the first time,

MIS is beginning to take the technology seriously.

How did this happen?

For the answer, we need to start with the first act.

In the late 1970s and early 1980s, artificial intelligence was the premier hot topic in an age of hot topics. AI was, or so went the hype, the technology that would bring us robots and thinking machines. The leading researchers of the science were generally looked upon as a priesthood whose judgment was not to be questioned and whose

companies were to be funded regardless of cost.

So powerful was the AI mystique that AI-related vendors coasted through the computer slump of 1984 and 1985 without missing a dime in venture capital. So dominant were AI concepts among researchers that few remembered that there had been other approaches to automating intelligence.

Then, after 1986, AI went out of fashion.

Critic urges AI redirection due to flaw in traditional theories. Page 30.

## PERSONAL COMPUTERS

## ARTIFICIAL INTELLIGENCE

Industry observers began to point out that AI's progress was disappointingly slow. The robots and thinking machines promised years before had failed to materialize.

Worse still, companies whose products were indivisibly (if sometimes unfairly) linked with AI — such as Symbolics, Inc. in Cambridge, Mass., and its near twin, the now-defunct Lisp Machine, Inc., also in Cambridge — suffered devastating financial reverses.

End users, venture capitalists and industry observers began to question the formerly unquestionable AI priesthood.

What accounted for this AI winter? The answer depends on whom you ask. AI's harshest critics argue that AI's problems are deep within the technology itself. Ultimately, they say, AI is based on the underlying premise that reality can be described in terms of logic.

But, critics claim, reality is far too complex to model with logic alone. They say the brain seems to make deliberate use of illogic, dealing with the torrents of information that make up real life by disregarding most of the incoming data and making good but not perfect guesses about the rest.

(One famous example used by these critics is the phrase, "I heard the birds singing outside my window this morning." The brain instantly interprets this statement to mean something like every-day sparrows chirping. But if subjected to rational analysis alone, the sentence could just as easily refer to turkeys doing grand opera. And for most rule-based AI systems, the second interpretation would seem no more outlandish than the first.)

Indeed, as AI's fame has waned, non-rule-based systems have stepped into the limelight. Suddenly, rival methodologies are reaching the point at which AI was a decade ago. Such things as neuro-morphic systems, which attempt to model the physical functions of the brain, are becoming fashionable.

Meanwhile, AI's less harsh critics say the problem is not in the technology but in its practitioners. By 1985, the AI fraternity had acquired a reputation for awesome arrogance. Researchers from other areas of computer science told horror stories of their work derailed or zero-budgeted by AI programs that demanded ever more and delivered ever less.

Would-be users, and particularly MIS officers, offered more chilling tales of AI systems that did not work and AI vendors that expected their customers to keep shoveling in the money, no matter what the consequences. Underscoring the technology's declining popularity, there was even a joke, widely told in the industry, that played off humorist Will Rogers' famous line, "I never met a man I didn't like." The punch line? "Will Rogers never met anybody in AI."

#### Sometimes logic works just fine

But there are those who point out flaws in both theories. The fact that AI is rule based and life is not does not alter that there are a lot of situations, particularly in the corporate world, in which logic works just fine. A lot of business decisions are as much governed by rules and cases as any expert system.

And even if AI paraisans are guilty of the sin of pride, the whole history of the computing industry shows that arro-

gance is not a barrier to business success.

So what really caused AI's problems? Why did the makers of AI hardware and software do well prior to 1986, and then suddenly suffer after that year?

For that answer, we must go to the second act.

In a strange way, AI and MIS have a lot in common. Both came to power via large, dedicated machines. Both were viewed, however unfairly, as removed from end users. And finally, both were seriously troubled by the personal computer.

Tom Schwartz of Tom Schwartz Associates, a consultancy in Mountain View,

**In a strange way, AI and MIS have a lot in common. Both came to power via large, dedicated machines. Both were viewed, however unfairly, as removed from end users. And finally, both were seriously troubled by the PC.**

Calif., explains the phenomenon simply. "What people failed to look at was the increasing power of general-purpose microprocessors. Every year, general-purpose silicon had been roughly doubling in power. You could plot it on a graph. It looked almost like a law of nature," he says. In other words, every year conventional personal computers grew closer and closer in power and performance to dedicated LISP systems.

Then, in 1986, the first personal computers based on the Intel Corp. 80386 processor began to ship. Schwartz says, "Suddenly, the PC-based AI vendors had vastly more room to play in. And remember, these people already had a lot of experience in making fairly significant programs work in small spaces. They were very skilled at squeezing high performance out of the low end. . . . Meanwhile, though, the original AI vendors couldn't even imagine getting AI software to run on a PC."

In turn, people who were interested in developing expert systems or other AI applications had no particularly good reason to purchase either a dedicated symbolic processing machine or the software that was designed to run on one. Why not make use of the micros they already owned to take advantage of AI? Makers of PC-based systems found themselves in a boom market. The winter of AI's discontent looked like glorious summer to them.

Cambridge-based Gold Hill Computers, Inc., whose Common LISP is a PC LISP market leader, claims to have tripled its revenue during the period that the high end of the AI industry encountered serious trouble. Gold Hill's president, Carl Wolf, attributes his company's success to the Intel 386 chip. "In the spring of '86, you saw the first 386 machine. It stopped the world. People who'd been planning to buy a symbolic processing system had to rethink things a bit. They had to ask themselves why they wanted a big, expensive symbolic processor when they could get LISP that would run just as fast on a PC."

PC-based expert systems became an overnight industry on a grand scale. "You want numbers? I'll give you numbers," Wolf says. "In 1985, I did a sales call. I

went to a big bank in New York. I talked to the senior vice-president there, and I was excited about LISP. I was telling him how he ought to write AI systems for banking and so on. He listened to me for about three minutes, then he said, 'OK, tell me about the products that are already out there for banking.' Now, at the time, I knew of about three expert systems in the whole world, and they didn't relate to banking. Finally, he threw me out. He said it was a strange technology that ran on strange machines and was written in a strange language by strange people from Cambridge."

Today, a bare three years later, there are hundreds of such applications, according to Wolf. Gold Hill maintains a catalog of applications from its own OEMs that is more than 90 pages.

AI had risen, fallen and risen again. The curtain goes up; we find ourselves where we started, in the third act.

And so it is that there is money in AI again. This time, though, the profits are being provided by customers who buy the technology to make expert systems for PC-based applications rather than by investors, venture capitalists and research operations.

There are dozens, maybe hundreds of software vendors. Some of these — such as Gold Hill, American Expertech, Inc. in Incline Village, Nev., Neuron Data, Inc. in Palo Alto, Calif., and Paperback Software International in Berkeley, Calif., (whose inexpensive VP-Expert is one of the most widely installed PC expert system shells) and so on — have developed products on PCs for their entire corporate lifetimes. Others, such as Intelcorp in Mountain View, Calif., got their start in the original, dedicated symbolic processor world, were badly burned there and are making bids in the 386-based systems market. Some, such as Texas Instruments, Inc. in Austin, Texas, span both worlds.

#### Symbolic gestures

Indeed, what may be the most remarkable trend in AI is that former symbolic processor vendors are now looking at transferring their hardware to the desk top. For instance, TI recently announced a pact with Apple Computer, Inc. under which the companies will jointly market a version of the Apple Macintosh that is equipped with a special symbolic coprocessor based on TI's single-chip LISP machine. By like token, Symbolics, which has Ivory, its own single-chip LISP engine, has announced an intention to produce a similar product.

But what are the buyers doing with the expert systems technology that they buy? "Not surprisingly," says Ellen Staelin, senior consultant with the technology future service of International Data Corp., a market research firm in Framingham, Mass., "some of the first applications relate to DP."

Thus, maybe the most notable thing about the third act of AI's career and what may say the most about the technology's success is that this time around MIS is supporting it. Where before AI was a strange thing from strange people, now it is in the heartland of computing. In particular, it is being used to create increasingly friendly, intelligent interfaces between MIS and end users.

For example, the Washington, D.C., office of the Big Eight accounting concern

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Circle Reader Service Number 11

# Critic breaks the AI mold with "irrational" approach

BY STAN KOLODZIEJ  
SENIOR EDITOR

WHILE PARTS OF artificial intelligence are forging ahead with the help of personal computers, AI in general is hardly out of the woods yet. Joseph Weizenbaum, MIT's long-standing deflator of AI hubris, now has a West Coast AI companion critic in Fernando Flores, chairman of Action Technologies, Inc., an Emeryville, Calif., software company. Flores is also a coauthor of *Understanding Computers and Cognition*, a scathing indictment of the entire scaffolding of "rational thought" on which AI is superimposed.

Flores makes a compelling argument that much AI work has been doomed to fail because it has been forced, through the evolution of rational, scientific thought, to ultimately regard man as a complex data processing machine.

"The problem is that AI is based on bad theory," Flores says. "Designing machines to extend human capabilities, rather than trying to duplicate the human mind, makes more sense. It would prevent a lot of frustration."

"Our commitment," he writes, "is to develop a new ground for rationality — one that is as rigorous as the rationalistic tradition in its aspirations but that does not share the presuppositions behind it."

Flores's company has moved theory into the real world with The Coordinator, a network product that is meant to extend the efficacy of communications within the office. Flores says he will use The Coordinator as a building block to construct more such "action-oriented" communications tools through Action Technologies.

"Our ultimate goal, however," Flores explains, "is not a debunking [of AI] but a redirection. The alternative we pose is not a position in a debate about whether computers will be intelligent, but an attempt to create a new understanding of how to design computer tools suited to human use and human purposes."

Coopers & Lybrand has used Gold Hill's Common LISP to develop Q-Shell. According to Leo Campbell, internal consultant at Coopers & Lybrand, "[Q-Shell] is an expert system shell on which we run a number of applications, specifically Expertax. That, in turn, is an expert system for the corporate tax accrual and planning process."

Among Coopers & Lybrand's clients are large corporations whose tax prob-

lems are complex to say the least. Prior to Expertax, Coopers & Lybrand had its clients fill out paper forms by the boatload. "What happened in the past," Campbell explains, "is that an auditor would go out to the client with a rather thick questionnaire and ask all sorts of questions. Lots of them. There could be as many as a thousand questions to be asked."

The auditor would then return to the

home office with the completed questionnaire and try to deal with all the possibilities for human error — typos, unreadable responses and so forth.

With Expertax, the questionnaire is put on a PC and made intelligent. It guides the client through the interview, asking appropriate questions and accepting appropriate responses, he says. The result is considerable time savings for everyone concerned.

Expertax is not a commercially available product; Coopers & Lybrand won't sell it. Rather, it is a device to increase the productivity and effectiveness of Coopers & Lybrand and its clients. As such, it can be considered a tactical, and even strategic, weapon. Expertax has been so successful that Coopers & Lybrand is bringing out similar systems for related industries and other branches of their consulting operations.

**Lending a hand in loan decisions**  
Meanwhile, another similar application is currently being prototyped at Manufacturers Hanover Trust Co., a financial institution in New York. There, the goal is to create a system that will be used in decision support by commercial loan officers. It, too, would be an intelligent system that would marshal relevant information at the desktop. Also, like the Expertax application, it is meant to link the desktop with mainframe data.

"We had a mainframe system," says Elizabeth Byrnes, Manufacturers Hanover's vice-president of new technology research, "but it had a number of disadvantages. It was inflexible and growing more complex. Worse, the people who were responsible for the system tended to talk in, shall we say, *system*. Meanwhile, the account officers uptown knew all the details, had all the relevant information, but they couldn't communicate with the systems people."

So working with an expert system development tool from Gold Hill, the bank set out to develop a system that would, Byrnes claims, "bring responsibility and control of data back where it belongs — with the account officers." The result is a prototype that Byrnes describes as "basically an intelligent form, on-line, which replaces some 30 different paper forms we used to use."

Byrnes states that the prototype is

now "pretty robust, and we're now trying to integrate it into our existing technical environment."

It is in the requirement of being integrated into existing technical environments that the new forms of AI most differ from the old. Byrnes, for instance, says she intends the system to run on 80386-based machines under Microsoft Corp. Windows. "The decision has already been made to go with the 386," she explains. "This application must fit into that environment. This AI application is going to be a part, only a part, of people's lives."

More exotic machines, dedicated LISP processors, even fancy add-ons for some of the 386 PCs are not options for Manufacturers Hanover. The application, while valuable, is not so important that the company can afford such machines. "This application is going to save us a lot of money," Byrnes affirms. "It's even strategic. But it's not going to make us millions of dollars. It isn't, say, [the same as] looking for oil wells."

That kind of practicality has been rare in AI before. "[AI] kind of got itself separated," Byrnes adds. "It thought it was the center of the world, when, in fact, the workstation was the center."

Now that AI really is in the center on the PC, AI will probably never let itself be detached again. But it may not any longer be called AI per se.

Already, the technology is beginning to blend with other technologies like data bases and user interfaces. A fairly good argument can probably be made that AI is already alive in the interface of every Macintosh and Windows-based PC, both of which make use of the AI-like concept of icons and object-oriented programming and both of which can be traced directly back to the AI-oriented research at Xerox Corp.'s Palo Alto Research Center.

But for the brief period to come when it is still possible to distinguish AI from other computer technologies, where is it headed? What will the fourth act reveal about AI?

For that, we have a little foreshadowing. "All of sudden," consultant Schwartz claims, "AI people have discovered the mainframe. I think that the next battlefront for expert systems will be an entirely different one than any they've been on in the past — the mainframe." ♦

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# Building a foundation for Presentation Manager



BY MICHAEL GUTTMAN

juggernaut of easy-to-use graphical interface environments continues to gain momentum despite the much-publicized rash of legal battles between Apple Computer, Inc. and Microsoft Corp. over who owns what rights to Microsoft's Windows presentation graphics program.

Prime among these environments is the long-awaited Presentation

Manager currently being developed jointly by IBM and Microsoft and scheduled for release in the fourth quarter of 1988. Well before its release, Presentation Manager is already of major interest to software developers and MIS departments concerned about compatibility with IBM's next generation of systems and application software.

At this time, solid information about the Presentation Manager is rather spotty. On the one hand, IBM is exercising most of its usual reticence about a yet-to-be-released product, not revealing many details about the Presentation Manager to the general public and showing the graphical interface's innards to only a privileged few.

On the other hand, announcements and rumors now appear almost daily about the development of Presentation Manager, with both IBM and Microsoft continually emphasizing its importance and high priority.

Guttman is manager of consulting services for Morrissey Associates, Inc., a software development and consulting firm with offices in Skokie, Ill. and Dallas.

With some careful digging, there is much that can be inferred from publicly available information about the Presentation Manager. The product will be a complete graphical interface front end for personal computer applications similar to Microsoft's Windows. However, unlike Windows, which runs with 640K bytes of random-access memory using plain-vanilla Microsoft MS-DOS or IBM PC-DOS, Presentation Manager will run only under IBM OS/2, thereby requiring an IBM Personal Computer AT or high-end Personal System/2 with 2M bytes of RAM or more. It will run concurrently with other OS/2 applications and will share with them OS/2's multitasking, communications and other services.

This will make Presentation Manager fully compatible with and connectable to other applications running under IBM's much-ballyhooed Systems Application Architecture (SAA).

Like Windows, Presentation Manager will support all the stock graphics devices that have become so popular recently — movable, overlapping windows, pull-down menus, icons, scrollable list boxes, pop-up dialogues, variable text



## PRODUCT PLANNING

fonts and sizes and a full range of color graphics. However, Presentation Manager will be a bit more than just Windows for OS/2; it will fully adhere to the complex set of graphics standards defined in the Common User Access portion of SAA. This means that the graphical constructs supported by Presentation Manager should be transferrable to every other piece of IBM equipment and software, at least as soon as SAA is fully implemented.

Despite their differences, Presentation Manager and Windows do share a common structure and philosophy. In fact, Microsoft has claimed on several occasions that applications written for Windows will run under Presentation Manager.

### If, as the evidence suggests, Presentation Manager and Microsoft Windows are to be closely related, much can be deduced about the internals of Presentation Manager by examining the well-known, publicly available features of Windows.

Furthermore, Microsoft has now christened its latest version of Windows with the subtitle "Presentation Manager," a clear hint that it intends to position Windows and Presentation Manager as kissing cousins in a close-knit family of presentation graphics products. If, as the evidence suggests, Presentation Manager and Windows are to be closely related, much can be deduced about the internals

of Presentation Manager by examining the well-known, publicly available features of Windows.

Unfortunately, Windows has gained the reputation in certain quarters of being merely a windowing utility for existing PC- and MS-DOS applications, and a memory-hogging, persnickety one at that. Indeed, when compared as a simple MS-DOS application swapper with other

utilities, such as Quarterdeck Office Systems Co.'s Desqview and Softlogic Solutions, Inc.'s Software Carousel, Windows neither shines nor breaks new ground.

Looked at on its own terms, however, Windows appears in a whole new light. Although Windows will grudgingly tolerate generic MS- and PC-DOS applications (which, in Windows jargon, are somewhat disparagingly referred to as "old apps"), Windows' real strength lies in providing a rich environment of services for programs written expressly to run under its control ("Windows apps").

Applications written to Windows' exacting specifications not only share the same screen real estate but also have the same "look and feel." And Windows offers services beyond mere graphics — Windows applications also have the ability to share code, data and processing power under a complex but powerful multitasking system. All this functionality clearly presages the features of Presentation Manager and OS/2.

The choice to implement applications under Windows is not easily made, however. Windows is not a set of canned subroutines for manipulating screen graphics that "old apps" can be retrofitted to use. No — true "Windows apps" must be programmed to conform precisely to a demanding set of rules that define not only the use of screen graphics but also such internal details as program flow and memory management.

#### Brave new world

Windows creates and enforces a whole brave new world of programming, a software development paradigm that, once accepted, completely dominates the way an application is designed and programmed.

Perhaps it is for this reason that Windows has been rather slow to catch on among developers. While users get little benefit from Windows' perfunctory treatment of "old apps," developers are put off by the substantial investment of time and energy required to understand the Windows environment well enough to create true "Windows apps" that can utilize its many advanced features. Because Windows is not a mainstream product under MS- and PC-DOS and has never had IBM's blessing, it has been far easier for developers to ignore Windows than to tackle its complexities, whatever the possible benefits.

With the coming of Presentation Manager, however, the incentive to cross the software Rubicon that Windows has created will become very powerful. Presentation Manager will enforce a set of software development constraints very similar to Windows.

Therefore, while many "old apps" most likely can be retrofitted to run under generic OS/2, they will almost certainly have to be completely redesigned and reprogrammed to run under Presentation Manager. But unlike Windows, IBM-endorsed Presentation Manager will prove very difficult to ignore.

Moreover, the need to confront the complexities of Presentation Manager will not be limited to commercial developers. IBM-based MIS shops that wish to (or must) participate in the SAA revolution will eventually be forced to come to terms with Presentation Manager, which will rapidly become the standard for user interfaces on all IBM applications.

Both developers and MIS shops have a

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```

P' CICS' .a .b
FIN. GO TO CICS-CONTROL.
READ INPUT.
EXEC CICS HANDLE CONDITION MAFILL(NOTMOD) MAFEND(NOTFOUND)
ERROR(CERRORS) DUPREC(DUPREC) END EXEC.
EXEC CICS RECEIVE MAP('XDCHMS') END EXEC.
IF EIBTRID = 'UPDT' THEN
EXEC CICS READ UPDATE DATASET('FILE') INTO(FILE)
RIDFLD(NUMB IN COMPARE) END EXEC
IF FILEREC IN FILE NOT REENTER TO MSKLO
MOVE 'FILE ALREADY UPDATED'

```

NAME	EXT	SIZE	DATE	TIME
ADIDENTY	COB	2608	81/12/87	12:42P
ADIDENTY	COB	2568	81/28/86	8:02A
ASBAMCH	COB	1536	81/29/86	18:13A
ASBAMCH	COB	1536	81/25/85	11:47P
ASBAMCH	COB	6134	81/12/87	12:40P
ASBAMCH	COB	1824	81/02/86	8:11P
ASBAMCH	COB	2880	18/38/85	9:47P

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## PRODUCT PLANNING

much shorter time to digest Presentation Manager and its implications than might be imagined. Although Presentation Manager won't be released until year's end, users are rapidly coming to expect the sort of friendly interface that Presentation Manager is supposed to provide and that is already a standard feature on Apple machines, IBM's chief rivals in the business workstation market.

Just keeping up with the ever-increasing demands of users for easy-to-use software should force many developers to take a look at Presentation Manager as early as possible.

From the MIS perspective, in which projects often have three- to five-year lead times, the implications that Presentation Manager is likely to have on system design during the next few years are substantial. Ignoring these implications now could prove quite costly in the not-so-distant future when applications may have to be reengineered to be fully compliant with SAA.

The upshot of all this speculation is that developers and MIS shops are now faced with planning for a major development in software technology that few have seen and that won't even be released until at least the end of the year.

Furthermore, the problem of digesting Presentation Manager won't end when it is released — most software designers will face a steep learning and retooling curve before they can figure out how to use IBM's new graphical interface and how it will fit into product implementation plans.

The problem of retooling for Presentation Manager won't be made any easier by the fact that few development tools are likely to be available for the product very soon. As with Windows, the language of choice for Presentation Manager for some time to come will likely be C, which is not yet familiar to many application programmers in the MIS community.

However, even seasoned C programmers will likely face a sizable challenge mastering the relatively complex concepts and techniques required to interface properly with the Presentation Manager environment.

Beyond the sheer mechanics required to work with Presentation Manager, there is another, perhaps more fundamental problem for software designers — figuring out how their applications will look and feel in a high-powered presentation graphics environment like Presentation Manager.

Unlike the rather rigid single-tasking, text-based environments of yore, Presentation Manager will offer an almost limitless palette of design possibilities that will take developers a long time to sort out into a useful framework for their own applications' user interface.

#### Clues for developers

One way for software developers to get an idea now of what they will be facing when Presentation Manager hits the scene is to take a good look at Microsoft Windows (it is not, after all, an IBM product), the fact is that Windows is more than similar enough to Presentation Manager to warrant close attention.

By looking at existing commercial Windows applications, such as Microsoft's Excel, examining the Microsoft Windows Software Development Kit and studying some of a growing number of books and

articles on Windows programming, developers can gain a head start on Presentation Manager development well before the product's actual release date.

One thing that becomes painfully obvious from looking at Windows is that developing for it is quite unlike programming in almost any other previous environment. This discrepancy is because Windows is essentially an object-oriented environment, and interfacing to it requires at least a basic understanding of this hitherto little-known approach to applications development.

Because Presentation Manager will definitely share the object-oriented structure of Windows, potential users can anticipate some of their retooling require-

ments for Presentation Manager by conducting a little research into the subject of object-oriented programming.

#### Object-oriented gap

Unfortunately, neither IBM nor Microsoft currently offers any sort of object-oriented language for personal computers. However, Microsoft has announced that it intends to make efforts in that direction soon, some of which will undoubtedly be aimed specifically at supporting Presentation Manager and Windows. In the meantime, there are a few third-party object-oriented programming language packages available for PCs.

The importance of getting a jump on Presentation Manager cannot be overem-

phasized. It has taken developers nearly five years to become comfortable with Apple's Macintosh, which sports an interface, internal structure and a learning curve similar to that of Presentation Manager. Even more revealing is that there are relatively few applications currently available for Windows, now well into its third year.

But while the perils of Windows or the Macintosh could be left to the pioneers, Presentation Manager, with its integral place in SAA assured by IBM, will surely receive a lion's share of attention. Those savvy enough to get in on the leading edge of this new software technology should reap outstanding benefits as the Presentation Manager marketplace matures. ♦

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# products

## TECH TALK

### TI, Apple expedition into AI yields LISP chip/Mac hybrid

By MICHAEL TUCKER

Recently, the industry's attention has been fixed on whom Apple Computer is feuding with — that is, Microsoft and Hewlett-Packard. Apple is suing both over the "look and feel" of their user interfaces. But less attention has been paid to the vendor with which Apple has become positively chummy — Texas Instruments.

In March, Apple and TI announced a joint product — the first such product in Apple's history — the Microexplorer, which is a standard Apple Macintosh II with a coprocessor board sporting TI's single-chip LISP processor.

To explain how the two companies found themselves married and with a child to boot (and, for that matter, why the union should concern MIS), we have to go back a bit.

In the late 1970s, symbolic processing was done more or less experimentally at MIT, among other places. The technical support staff at the university decided to license the technology from MIT and spin off as a company. Initially, it was

Natural language interface that sits in DOS shell unveiled for PCs. Page 36.

thought that only one such firm would be born.

But gradually, the staff-turned-entrepreneurs split up, partly over business issues and partly over personal ones. When the dust settled, there were two companies, both based in Cambridge, Mass. — Lisp Machine, Inc. and Symbolics, Inc. Both were selling into research installations and, as such, were exciting to researchers but not particularly to MIS.

TI entered the game in the early 1980s. The Austin, Texas-based semiconductor giant had a long history with exotic processing, including dedicated LISP engines. In fact, TI was then becoming involved with several government programs that aimed to apply AI to real-world situations, particularly in the military. For instance, the U.S. Department of Defense's

Defense Advanced Research Projects Agency (DARPA) was promoting the Strategic Computing Program (SCP).

The SCP was supposed to help U.S. military planners address the distressing fact that in any large war in the future, the U.S. would probably face a numerically superior enemy. To put it bluntly, the Soviet Union was turning out twice as many tanks, planes, ships and soldiers as the U.S. was.

Part of the answer, DARPA reasoned, was to make U.S. tanks, planes, ships and so on more effective than or equal to two or three of the enemy's wares. The SCP was to assist in that effort by producing such things as a pilot's associate, that is, a powerful expert system that could assist aircraft pilots in combat situations.

#### Future technologies

But the SCP required AI technologies that didn't exist at the time — like symbolic processors that were faster and more powerful than those available but that were, at the same time, much smaller than any yet made. It needed, in fact, entire symbolic processing machines on a single chip.

TI had the semiconductor technology and the military contacts to produce such a chip, but it lacked a commercial presence in symbolic processing.

So TI invested heavily in Lisp Machine and became the firm's first major customer. TI then ventured into the symbolic processing market with the Explorer symbolic processing workstation, a direct rival to the workstations then being sold by Symbolics. Former Lisp Machine employees have said that the first Explorers were, in effect, little more than Lisp Machine systems with TI labels.

But during the next few years, TI began to withdraw from Lisp Machine. Increasingly, the components in the Explorer workstation would tip to the TI side, while TI's single-chip LISP processor program began to show signs of real progress. Finally, TI was able to show the chip in 1986. The new generation of Explorers was, in fact, based on the chip.

Continued on page 37

## PRODUCT CLOSE-UP: PC SOFTWARE SERVICE

### Aftermarket reformation

A start-up software publisher and distributor, Strategic Solutions, Inc. in Waltham, Mass., has a service that could challenge the way in which the personal computer software business is done.

Essentially, it provides ultra-vertical aftermarket applications that run on top of industry-standard PC software — spreadsheets, data bases, word processors and so forth. Furthermore, the service reportedly provides close support and consulting to its customers, something that previously has been rare in the aftermarket arena.

Strategic Solutions maintains a catalog of more than 140 applications in 20 vertical areas that enhance 12 base applications: specifically, Ashton-Tate Corp.'s Dbase, Microrim, Inc.'s R:Base and Ansa Software's Par-

adox data bases; Lotus Development Corp.'s 1-2-3 and Symphony and Microsoft Corp.'s Excel spreadsheets; Ashton-Tate's Multimate, Microsoft's Microsoft Word, Wordperfect Corp.'s Wordperfect and Micropro International Corp.'s Wordstar word processors; and Aldus Corp.'s Pagemaker and Xerox Corp.'s Ventura Publisher desktop publishing applications.

If Strategic Solutions succeeds in its venture, it will have cracked a market that few have dared before. Recently, the economics of PC software have resembled those of commercial consumer goods. Vendors, publishers and developers had to back very large volume products to survive. Any one package had to appeal to the broadest possible audience to justify the cost of

Continued on page 35

## BLUE BEAT

### PS/2 family ties

Brian Jeffery

Exactly what is the IBM Personal System/2? Most people tend to think of the PS/2 as a personal computer. In hardware terms, it looks like a PC. But IBM's OS/2 Extended Edition is not a PC operating system, and its Micro Channel is not exactly the average PC bus.

The fact is that the PS/2 is IBM first and Personal System second. The architecture isn't even new; most of its components have been around and voluminously described in IBM documentation for years. The trouble is IBM hasn't stated, "Well, this is where the PC fits," or, "Now, imagine we did that on a workstation with an Intel chip instead of a processor block." Much of the industry hasn't even been listening to IBM. There are reams of documents available



from IBM, cheerfully given, that explain clearly what it is doing.

For example, information on IBM's intentions are available on the following offerings:

- **The Micro Channel.** Derived from an alternative IBM 370 I/O structure first developed by the company in the 1960s for a federal government project, the Micro Channel is the PS/2 component of a global resource management architecture also being implemented on IBM 3090s under VM/XA and VM/ISF and on 9370s under VM/SP Release 5 and later.

- **The Token-Ring network.** This is not a PC local-area network in the generally recognized sense. It is a more sophisticated bandwidth management system that is being implemented to

Continued on page 39

## PRODUCTS

# DVI disk makes a splash

*Said to handle data from text to numbers to live-action video*

Digital video interactive (DVI), a new method of compact disk/read-only memory (CD-ROM), has been developed by General Electric Co. A DVI disk can combine large data bases of text, data, numbers, still photos and live-action video.

MIS might have particular uses for DVI in cases in which radically different types of data must be stored on small machines. GE has suggested, for instance, that it might be used in personnel depart-

ments in which individual files might contain everything from resumes to payroll records to filmed interviews.

GE is attempting to market DVI as a standard in CD-ROM and plans to sell DVI boards to systems integrators. It has also set up a new division, GE DVI Technology Venture, based in Princeton, N.J., specifically to promote the technology.

Several firms have announced an intent to support the technology. Microsoft

Corp., for instance, announced support for DVI in March. Microsoft has been trying to promote CD-ROM in some form for more than two years. It has, however, been frustrated by the fact that CD-ROM has been slow to take off in the personal computer world; DVI may finally bring CD-ROM into the limelight.

Also announcing support for DVI in March were Lotus Development Corp. and Intel Corp.

In the process of promoting DVI, however, GE has tripped off what may be a war. DVI is the rival of another technology, compact disk/interactive (CD/I), which is being promoted by a consortium of European and Japanese firms. CD/I can do everything DVI can, except support

live-action video. Also, CD/I requires the purchase of a dedicated CD/I player. CD/I's backers seem to envision it as a consumer product sold, like videocassette recorders, to the home market.

So far, CD/I has not been blessed with overwhelming success. Consumers cite the technology's inability to support live-action as a drawback. MIS, meanwhile, has no need for dedicated CD/I players that cannot interface with existing applications. Thus, DVI is more likely to appeal to corporate America as a means of giving mainframe-like data storage capacity to personal computers. Whether DVI can succeed in other markets remains to be seen. — MICHAEL TUCKER

Circle Reader Service Number 118

## Aftermarket

*Continued from page 34*

its distribution.

About the only channel of distribution available to low-volume software has been catalog sales. But it has been difficult for MIS to exploit mail-order purchasing because service and support in that channel have traditionally been minimal.

The irony is that although a channel did not exist to move such software, a market demand did. MIS departments that have to support large numbers of corporate PCs are eager for vertical solutions that can improve end-user productivity but that MIS does not have to write. It makes no sense to take accomplished programmers off major DP assignments to provide income tax templates for 1-2-3 or Clip Art for Ventura Publisher.

Strategic Solutions has developed what it believes to be the best method of reaching that low-volume add-on market. The vendor has combined desktop publishing, low-volume disk duplication and telephone sales and support to produce a low-overhead low-volume approach to software marketing.

### How it works

Basically, the arrangement works like this: Software authors or small vendors contact Strategic Solutions and offer their products. If the firm likes what it sees, it signs a nonexclusive publishing or distribution pact with the author. A product write-up is included in the Strategic Solutions' catalog, and the product is stored electronically at the vendor's office.

Customers can use the catalog as a basic reference to decide what sort of software they might want. They phone Strategic Solutions, where consultants are available to help in the decision process.

Once a purchase is made, Strategic Solutions then duplicates as many disks and prints as many copies of the documentation as needed. Company principals call the process "inventory on demand." Effectively, the arrangement is publishing on a level at which runs of only one copy can still be profitable.

Strategic Solutions can thus be useful to MIS by allowing it to off-load part of the microcomputer management function without creating a micro management department. By like token, the company could become significant by proving not only the viability of the aftermarket software industry but also the paradoxical profitability of low-volume products in a mass market. — MICHAEL TUCKER

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## PRODUCTS

## Better late: 386 micro bows

If you thought it might be a little late to come out with an Intel Corp. 80386-based microcomputer, think again.

"Our research identified a market need for a high-quality microcomputer," explained Isaac Levanon, director of marketing for the Westwood, Mass.-based retail sales division of Arche Technologies, Inc. "We're going after Compaq Computer Corp. and AST Research, Inc., those that have the high-end [386] machines."

Arche Technologies' Rival 386 comes standard with 2M bytes of memory expandable to 16M bytes; optional 40M-

65M-, 80M- and 140M-byte fixed disk drives; a 1.2M-byte, 5¼-in. floppy disk drive; and Microsoft Corp. MS-DOS 3.3. It has a base price of \$4,395. Levanon said the Rival 386's 20-MHz speed will give users power for multiuser, multitasking networking and computer-aided design and engineering applications.

To further penetrate the high-end micro market, Levanon said the Fremont, Calif.-based company has also introduced the Pro-File 386 Server, a 386-based micro sporting a slim-line housing with a small footprint for use as a file server on

local-area networks. The Pro-File 386 Server sells for a base price of \$4,995.

Levanon's quest for personal computer power users apparently involves some deep pockets. Arche Technologies is being financed by Hunnan Enterprises, the Taiwan-based parent company of, among other ventures, Pro-Kennex, a manufacturer of tennis rackets.

In the near future, Levanon said, Arche will introduce IBM Personal System/2 clones running IBM's OS/2.

"I think this entire [PC] market has been concentrating too much recently on cheaper technology," Levanon added. "They're missing a big market that's looking for quality." —STAN KOLODZIEJ

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## DOS interface out for PCs

In the war for desktop dominance, the user interface has become the most hotly contested battlefield. Major personal computer vendors are fighting tooth and nail for the high ground of user friendliness. IBM's chief weapon is Microsoft Corp.'s Windows, while Apple Computer, Inc.'s is the Macintosh interface. Even the Unix vendors are getting into the fray, with AT&T and its allies deploying the Open Look interface.

What is common to all of these interfaces is that they are graphically oriented.

However, there is a start-up offering a different approach to providing a user-friendly interface for PCs. SAK Technologies, Inc., in Arlington, Va., announced Dostalk, a natural language interface for Microsoft MS-DOS. Although there are other natural language products in the field, most are either for individual applications (in much the same way that, for instance, Lotus Development Corp.'s HAL was meant for Lotus spreadsheet products) or for much larger machines.

Dostalk, however, comes in an honest-to-goodness MS-DOS shell. It sits directly atop the operating system and provides a fairly articulate interface between the user and the machine, according to SAK. The users that *Focus* contacted said working with the product was a bit like working with a human programmer. You speak to it in English, it attempts to understand what you really want and then it provides the necessary MS-DOS code.

### Love-hate relationship

This design is both good and bad. Dostalk, like its graphically oriented cousins Windows and the Mac interface, is right at the center of a dispute. Power users, the people for whom MS-DOS is second nature, say they flatly despise the product. For them, it simply gets in the way of their relationship with the machine.

Yet certain novice users who dislike and distrust MS-DOS in its native mode say they adore Dostalk — just as they prefer the Mac interface. To them, it is a quick, convenient way of dealing with what seems an alien intelligence.

Which side is right? Probably both. There will always be a select corps of people whose interest in the bits and the bytes will lead them deep into the iron of the computer. For them, "user-friendliness" is almost a contradiction in terms.

And the vast majority of computer users will never love programming, just as the vast majority of drivers will never love repairing their own automobiles. For them, Dostalk, and products like it, are clearly what is wanted and needed.

Dostalk presents an interesting irony. Originally, the point of PCs was to give nontechnical end users a way of doing their computing without MIS assistance and, in the process, get end users off MIS's back. Now, to make that happen, the industry finds it must create a tiny MIS department in each desktop system in the form of products like Dostalk.

Dostalk costs \$89.95 and requires 256K bytes of random-access memory, with 360K bytes of RAM recommended by the vendor. —MICHAEL TUCKER

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## PRODUCTS

## Tech Talk

Continued from page 34

The kicker, however, was that while TI had been busy with this remarkable feat of engineering, the AI market was in trouble. Lisp Machine went bankrupt and was ultimately purchased by one of its own distributors, Gigamos Systems, Inc. in Lowell, Mass. Symbolics was in almost as serious trouble, though it managed to avoid bankruptcy and to find rewarding niche markets to get into, such as graphics processing.

But at the time, it looked very much like symbolic processing machines were history. That observation seemed particularly true given the fact that although the high end of the AI world was in trouble, the low end, the personal computer-based AI products, was doing quite nicely. People were asking why a symbolic processor was needed when an Intel 80386-based system running AI programs would do almost as well.

Where did this leave TI? Alone with its brand new single-chip LISP engine?

Actually, TI was sitting pretty. It already had PC-based AI products, so it was happy to see the boom at the low end. As for the LISP chip, TI could still count on sales of the product to people who were interested in working at the high end, even though that market might be smaller than it once was.

But could there be a middle path? Something that would combine the power of dedicated symbolic processors with the appeal of the low-end market?

TI and Apple seem to be-

lieve there is. The test of their thesis is the Microexplorer. For \$15,000, the Microexplorer provides what is effectively one-half the power of a full-size Explorer workstation plus an Apple Mac II.

In some ways, it is a natural alliance. On the one hand, TI gets a tailor-made entry to the low end for its LISP chips. On the other, Apple has a means of being "AI for the rest of us." Envision, for instance, a Microexplorer on the desktop of a currency trader, with traditional number crunching on the Mac side of the operation and expert systems on the other. The whole of it would be interfaced via the Macintosh's familiar icons and graphics.

Even the engineers are happy. The Mac can be difficult to design for, but it is a relatively friendly platform for AI. With its Nubus, which came out of an academic setting as did symbolic processing, and its icon-driven interface, which came from Xerox's Palo Alto Research Center, the Mac II looks a bit AI-ish around the corners.

But does that feature mean there's a market for the thing?

**'The last gasp'**

Vendors working with AI applications on 386-based machines don't think so. Carl Wolf, president of Gold Hill Computers, Inc. in Cambridge, flatly calls the Microexplorer "the last gasp of the LISP engines. It's their desperate attempt to make themselves competitive [with PC-based systems]."

That may be the case. Yet symbolic processors have their advocates, even in MIS.

For instance, Eloquent Sys-

tems Corp. in Manchester, N.H., markets a group of products for the hotel industry based on the Explorer and a network of Macintoshes. Essentially, these products use the Explorer as an AI server with Macintoshes running at key locations throughout the hotel. Hotel personnel can then use the Explorer to provide decision support in dealing with problems that require unique expertise.

Why go with a support system that requires such exotic machinery? Jules Siburg, vice-president of MIS at Boston-based Sonesta International Hotels Corp., is one of Eloquent's customers, and he says that conventional hardware is not yet up to providing the kind of strategic services that can be had from a symbolic processor. "A lot of people underestimate what it takes," he explains. "I've seen techies turn their noses up at the whole idea [of hotel computer systems]. But a hotel is a complex affair. It's a 24-hour-a-day operation that requires a lot of expertise on the part of its employees—reservationsists particularly."

Eloquent is already looking into providing a Microexplorer version of its products. It is also thinking about producing other versions of them for service-intensive industries.

It is these kinds of real-world applications that give symbolic processor partisans hope that their systems may yet have a role to play at the lower end. In fact, the Microexplorer will soon have competition. Symbolics has a single-chip LISP engine, the Ivory, and says it plans to introduce a Mac coprocessor as well.

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## PRODUCT CHECKLIST

In April, Sun Microsystems, Inc. introduced its Sun386i workstation. Not only is it one of an emerging class of devices that manages to link the world of Microsoft Corp. MS-DOS to that of Unix, but it is also proof of the relative unimportance of hardware. Sun has pulled off the trick of having a fully compatible product line that spans three microprocessors.

At the top it has its Scalable Processor Architecture machines, in the middle are its older Motorola, Inc.-based products, and now, at the bottom, it has a system based on the Intel Corp. 80386 chip.

An entry-level Sun386i/150 comes with a 15-in. monitor, 4M bytes of memory, a keyboard, an optical mouse and the SunOS operating system. It costs \$7,990.

Sun Microsystems, 2550 Garcia Ave., Mountain View, Calif. 94043.

Circle Reader Service Number 122

When IBM rolled out its DB2 product, many of the software vendors that formerly sold data base wares to mainframe accounts found themselves in trouble. Some have tried to com-

pete with DB2, some have tried to take their products to the Digital Equipment Corp. market, and some seem paralyzed.

However, SAS Institute, Inc. has taken a new route — via personal computers. In March, SAS announced that its product line — collectively known as the SAS System — was available on PCs through Release 6.03. According to the vendor, the SAS System is a collection of data display and analysis tools that includes a fourth-generation language-like development language, screen control and graphics software, numerical applications and a data base management facility.

The base product costs \$495 for the first year per machine, with an annual renewal fee of \$250.

SAS Institute, P.O. Box 8000, SAS Circle, Cary, N.C. 27512.

Circle Reader Service Number 123

Worried about virus software infecting your disks? Foundationware may be able to provide you with some peace of mind. Its Vaccine product is said to reduce the risk of your

system coming down with something nasty.

A collection of modules performing different security-related functions, Vaccine reportedly can reduce the probability of infection and data illness by a virus to less than one in 100 billion.

Vaccine is available for Microsoft Corp. MS-DOS systems. It costs \$92.

Foundationware, 2135 Renrock Road, Cleveland, Ohio 44118.

Circle Reader Service Number 124

Personal computers are being used increasingly to do sophisticated graphics tasks. Nth Graphics Display Products has unveiled a graphics add-in board that, the company said, can give a PC the graphics manipulation power of a much larger machine. Called the 3D Engine, the board can give a standard PC two-dimensional and three-dimensional graphics in color with wire-frame and shading functions at speeds previously available only on dedicated computer-aided design and manufacturing workstations.

The 3D Engine costs \$5,995.

Nth Graphics, 1807-C West Braker Lane, Austin, Texas 78758.

Circle Reader Service Number 125

## CALENDAR

## June 12-18

**The 25th Annual Design Automation Conference.** Anaheim, Calif., June 12-15 — Contact: Pat Pistilli, MP Associates, Inc., Suite 102, 7490 Clubhouse Road, Boulder, Colo. 80301.

**1988 North American Pac-base Users' Conference.** White Plains, N.Y., June 12-16 — Contact: Linda Rose, CGI Systems, Inc., One Blue Hill Plaza, Pearl River, N.Y. 10965.

**Cintract '88.** Cincinnati, June 12-16 — Contact: Bill Brewer, Cincom Systems, Inc., 2300 Montana Ave., Cincinnati, Ohio 45211.

**Relational Data Bases: Practical Applications with Emphasis on DB2, SQL, Oracle and Ingres.** Minneapolis, June 13-15 — Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

**Voice '88 Conference & Exposition.** Dallas, June 14-16 —

Contact: Information Publishing Corp., P.O. Box 42371, Houston, Texas 77042.

## June 19-25

**Expert Systems and Artificial Intelligence Symposium.** Chicago, June 20-22 — Contact: Digital Consulting, Inc., 6 Windsor St., Andover, Mass. 01810.

**The 6th Annual PC Expo.** New York, June 21-23 — Contact: PC Expo, 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

**Systems Application Architecture.** Boston, June 23-24 — Contact: Digital Consulting, Inc., 6 Windsor St., Andover, Mass. 01810. Also being held July 25-26 in Chicago and Sept. 15-16 in New York.

## June 26-July 2

**Syntopican XVI.** New York, June 27-30 — Contact: Association of Information Systems Professionals, Suite 201, 104 Wilmot Road, Deerfield, Ill. 60015.

## After you master your remote environment,



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## Blue Beat

Continued from page 34

handle local PS/2 cluster communications and 370 channel-to-channel communications. It is also a core component of IBM architectural strategy for network management and telecom. The Token-Ring network will handle not only PS/2-to-PS/2 links but also channel communications among IBM 9370s and IBM's Silverlake offerings and, on backbone fiber-optic media, IBM 3090-to-3090 channel communications. The network will be merged in due course with IBM T1 and T3 bandwidth management systems.

• **The PS/2.** This is not a personal computer; it is not even a single product line. For example, the PS/2 Models 25 and 30, which do not support OS/2 and the Micro Channel, were designed by IBM Japan. Their motherboards were made by Matsushita Electric in Japan.

Coincidentally, this is the same setup that IBM has for its ASCII terminals. It is interesting to note that the PS/2 Model 30 is virtually the same hardware as the IBM 3161, 3162 and 3164 ASCII CRTs and that the PS/2 Model 25 is really no more than

an IBM 3151 ASCII CRT with a PC system unit attached. The structure is set up to merge the ASCII models of the PS/2 with IBM's ASCII CRT line.

In addition, you may have heard rumors about IBM merging the PS/2 with its 3270 CRT line (also known as the 3190 line). Who needs rumors? Break open an IBM 3192 or 3194 terminal and look at the hardware content, level of microcode support and I/O features. Then do the same for a PS/2 Model 50. These are already, in hardware terms, more or less the same products. With a little retooling, IBM could turn them out on the same production line with better than 95% common hardware.

Examine the 3190 line, and you'll also notice that at least 75% of what OS/2 Extended Edition will provide end users with will also be delivered to 3190 terminal users on-line.

• **OS/2 Extended Edition.** Why is everyone having so much trouble understanding this operating system? It is simply a downsized version of VM/IS with a few extra bundled add-ons. It uses an Intel CPU, some proprietary hardware and OS/2 to handle the same kind of real/virtual resource management that VM provides for 370 sys-

tems. The IBM approach is the same as that used for the company's Silverlake line and is reminiscent of the way IBM used a PC system unit to manage the I/O on the System/36 PC.

For those interested in knowing more, I recommend breaking open IBM's 5363, the System/36 model that IBM introduced last October. This is a unique box that already contains a PS/2 system unit and some other fun features that IBM won't be announcing for its other PS/2s until June.

• **Coprocessing.** Basically, IBM is implementing a network architecture that treats multiple computers as part of the same operating environment. The resource management functions resident within the network distribute data as required into anything from a PS/2 Winchester disk to a 3090 "DASD farm." The functions also arrange for processing tasks to be routed to and performed at a system designated for this purpose. This process is being done at the departmental level with PS/2s, at the mid-range level with 9370s and PS/2 Model 80s (which are small 9370s waiting for Bill Lowe's people to finish the microcode) and at the mainframe level through VM/ISF, announced in

February of last year and available now.

• **Single-level storage.** See Coprocessing.

• **Common user interface.** You're looking at it. OS/2 Presentation Manager windows front for Systems Network Architecture Distributed Function Terminal Mode windows, OS/2 graphics front for the IBM Graphical Data Display Manager environment and so on down the line. OS/2 Presentation Manager is a vehicle for integrating IBM PC-DOS into a user interface that looks and acts almost exactly like the 3270 Personal Computer. For applications software, the interface is pretty well defined in the Profs Application Support Feature.

• **PC dealers.** IBM has a role for these companies; they provide highly cost-effective configuration assistance, installation support, customer education and warranty service. The better dealers will in due course even come and put in departmental systems. The majority will turn into IBM authorized agents and will, relieved of the task of meeting back-breaking quotas, start visiting companies with an IBM rep and will take a commission from IBM for the sale.

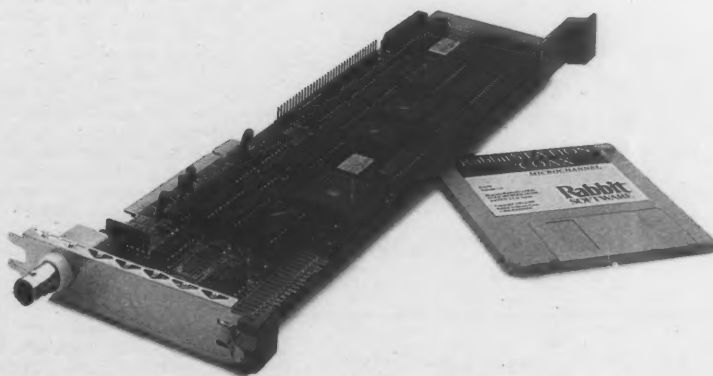
• **The mainframe role (or, Is**

**IBM turning mainframes into file servers for PCs?).** IBM is certainly emphasizing the role of the big 3090 machines for large-scale data management jobs, and that is what ESA/370 for the 3090E is all about. But PCs? IBM is not in the PC business any longer. It does, however, sell intelligent 3270-type workstations designed for use in a multilevel 370 coprocessing network. By the time all of those PCs are talking to all those mainframes (the new mainframes that will be necessary to handle the increased data volume), which faction has won out in the process will be a moot point.

All of this enables us to answer the burning question of whether IBM is committed to a two-tier architecture or a three-tier one. The reality is that the design parameters for the entire product line are consistent. This is a one-tier architecture with large mainframes, mid-range mainframes, small mainframes and workstations. The workstations possess an important role in the scenario — they access the mainframes.

Jeffery is managing director of the International Technology Group, a management consulting and market research firm in Los Altos, Calif.

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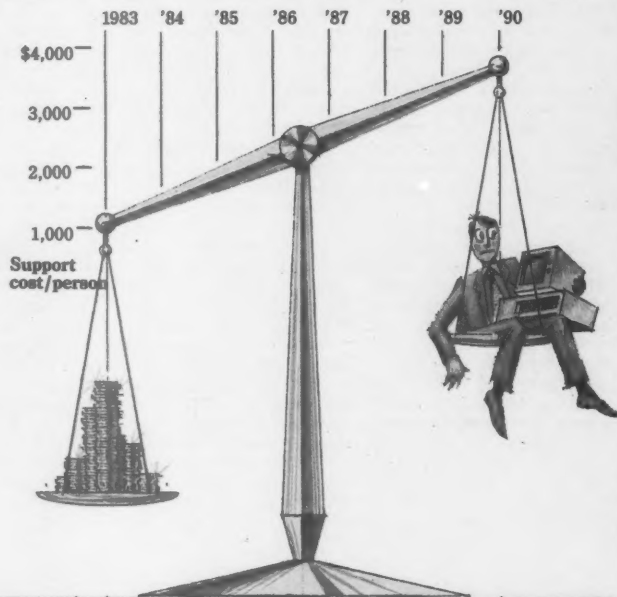
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## Support your local PC

Support consumes more than 50% of PC direct costs, by far the greatest single expense associated with PCs in most companies



INFORMATION TAKEN FROM A 1987 REPORT FOR LOTUS DEVELOPMENT CORP. BY NOLAN, NORTON & CO. THE DATA CAME FROM A NOLAN NORTON WORKING GROUP ON "PC PAYOFF," WHICH INCLUDED MIS AND OTHER CORPORATE EXECUTIVES, AND FROM NOLAN NORTON'S OWN DATA ON CORPORATE TECHNOLOGY MANAGEMENT.

GRAPHIC BY BRUCE SANDERS

## OF INTEREST

**"Finally, he threw me out. He said artificial intelligence was a strange technology that ran on strange machines and was written in a strange language by strange people from Cambridge."**

CARL WOLF  
GOLD HILL COMPUTERS, INC.

See story page 28

## next issue

**P**ushing software to its limits is the theme for next month's *Computerworld Focus*. Our Special Section digs deep into the stock market and examines how software developers are using technology to cope with the mounting volume of trading. We'll also bring you an update on revitalized Unix and the effect of IBM's Silverlake on programmers and analysts. In addition, you'll discover what's happening in data centers by looking at mainframe software's role in corporate information systems and remote software development on PCs. For a fresh outlook on software's horizons, pick up July's *Focus*.

## Superficial productivity

Michael D. Millikin

**B**ob Metcalfe, 3Com's senior vice-president of technology, calls any bit of information that has gained legitimacy through repetition a "factoid." Factoids are not inherently true or false; rather, they are assumptions or assertions that become self-evident (and without verification, in some cases). As a species, factoids thrive in the hot, moist climate of our industry. (Must be something about all that talking.)

One healthy factoid is that the adoption of a graphics user interface will automatically enhance productivity. Well, maybe.

A graphics user interface (a la Apple Macintosh or a host of others) makes applications easier to use — in some cases. (Just hope the Taylorites, time-motion efficiency experts, weren't around with their stopwatches the afternoon you blew off tinkering with the delicate shading of the graphs in your chart or twiddling with the typefaces in your report.) Studies have shown that Mac users tend to use more applications than Microsoft MS-DOS-based personal computer users. That predilection may stem more from the consistency of the interface than anything else.

I am the first to champion the adoption of a graphics user interface. By itself, however, that interface is not a guarantee of increased productivity. A pretty face is not enough.

With vendors scrambling to adopt, to develop or to protect graphical user interfaces, the real issue of what qualitatively increases productivity, efficiency and effectiveness is being lost, blotted out by the shadow of a looming factoid.

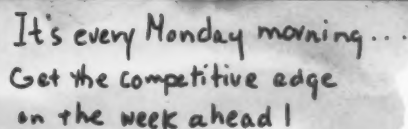
What users need is some underlying smarts in the system. They need agent-like facilities that will automate much of the procedural tedium. They need object-oriented systems that will allow them to focus on the business task rather than the applications tool. Users need facilities that will let them develop their own applications on the fly to meet an immediate, pressing demand. They need transparent connectivity to provide them with distributed network computing — transparent access to the entire data architecture from the window on the desktops.

Currently, there are two major systems vendors that are moving to provide users with that type of functionality. One is Hewlett-Packard with its New Wave. The other is IBM, particularly now that it has finalized its technology sharing pact with Metaphor Computer Systems, Inc.

Will other vendors do similar things? If they don't, if they don't position themselves to provide a competitive solution set, then they'll gradually starve. Much is in the works.

We should be focusing on the functionality and capability underlying the graphics interface in our discussions of increasing end-user productivity. It is what's behind the screen that will give us a better information processing system. The design of the trash can doesn't matter a whit.

Millikin is vice-president and senior analyst with Patricia Seybold's Office Computing Group in Boston.



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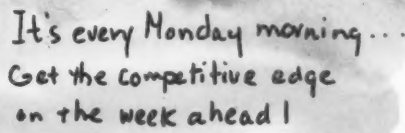
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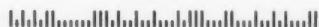
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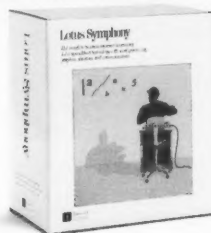
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